

Operation & Maintenance Manual

VEAM180100

WA470-5H

WHEEL LOADER

SERIAL NUMBERS WA470H50051 AND UP



DANGER

Incorrect operation and maintenance of this machine may be hazardous and cause injuries. The operator and maintenance personnel must read this manual before commencing operation or maintenance. Keep this manual within reach at all times and ensure that operating personnel read it at regular intervals.

NOTE

Komatsu has had the operating and maintenance instructions translated into all the languages of the European Union. Should you require a copy in another language please inquire at your local dealer's.

KOMATSU

FOREWORD

FOREWORD

This manual provides rules and guidelines which will help you use this machine safely and effectively. The precautions in this manual must be followed at all times when performing operation and maintenance. Most accidents are caused by the failure to follow fundamental safety rules for the operation and maintenance of machines. Accidents can be prevented by knowing beforehand conditions that may cause hazard when performing operation and maintenance.

WARNING

Operators and maintenance personnel must always do as follows before beginning operation or maintenance.

- Always be sure to read and understand this manual thoroughly before performing operation and maintenance.
- Read the safety messages given in this manual and the safety labels affixed to the machine thoroughly and be sure that you understand them fully.

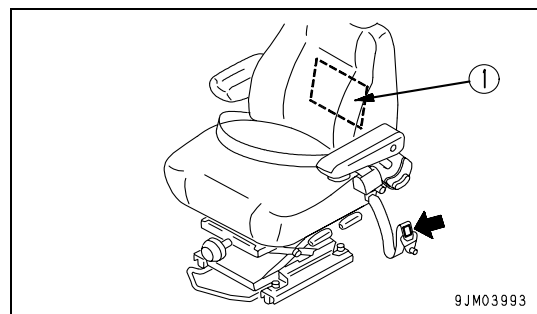
Keep this manual at the storage location for the Operation and Maintenance Manual given below, and have all personnel read it periodically.

If this manual has been lost or has become dirty and cannot be read, request a replacement manual immediately from Komatsu or your Komatsu distributor.

If you sell the machine, be sure to give this manual to the new owners together with the machine.

Komatsu delivers machines that comply with all applicable regulations and standards of the country to which it has been shipped. If this machine has been purchased in another country or purchased from someone in another country, it may lack certain safety devices and specifications that are necessary for use in your country. If there is any question about whether your product complies with the applicable standards and regulations of your country, consult Komatsu or your Komatsu distributor before operating the machine.

Storage location for the Operation and Maintenance Manual:
Pocket (1) at rear of operator's seat



EU DIRECTIVES

Machines supplied by us fulfil the Directive for Machinery 89/392/EEC and its supplements. If the machine is being used in another country, it is possible that certain safety regulations and specifications may not be fulfilled for use in that country. For example, priority vehicle warning lamps may be used in some countries, but are forbidden in others.

Please contact our dealer before using the machine if you have any questions regarding the fulfilment of standards and regulations in a specific country.

Notes on subsequent installation of electrical and electronic equipment and components

Electrical and electronic equipment and/or components which have been installed subsequently, emit electromagnetic radiation which can influence the function of the electronic components and sections of the machine. This can have an influence on the safety of the machine and endanger persons. For this reason, please ensure that the following safety instructions are observed.

If you are installing electrical or electronic equipment and/or components in the machine and connect them to the vehicle electrical system, you must check at own responsibility that the installations do not cause any disturbance to the vehicle's electronic system or other components. Above all, you must ensure that any subsequently installed electrical and electronic components comply with the EMV Directive 89/336/EEC in its current edition and bear the CE mark.

The following requirements also have to be met for subsequent installation of mobile communication systems (e.g. radio, telephone):

- Only equipment approved by national legislation (e.g. BZT approval for Germany) may be used
- The unit must be fixed in position
- Portable or mobile units may only be used inside the vehicles if they are connected to a fixed outside antenna
- The transmitter unit must be spatially separated from the vehicle's electronic system
- Make sure when installing the antenna that this is installed correctly with good earth connection between antenna and vehicle mass

Also observe Komatsu and manufacturer's installation instructions for wiring, installation and maximum permitted power consumption




SAFETY INFORMATION

To enable you to use this machine safely, safety precautions and labels are given in this manual and affixed to the machine to give explanations of situations involving potential hazards and of the methods of avoiding such situations.

Signal words

The following signal words are used to inform you that there is a potential hazardous situation that may lead to personal injury or damage.

In this manual and on machine labels, the following signal words are used to express the potential level of hazard.

 DANGER	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury. This signal word is to be limited to most extreme situations.
 WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
 CAUTION	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Example of safety message using signal word

WARNING

When standing up from the operator's seat, always place the safety lock lever in the LOCK position. If you accidentally touch the levers when they are not locked, this may cause a serious injury or damage.

Other signal words

In addition to the above, the following signal words are used to indicate precautions that should be followed to protect the machine or to give information that is useful to know.

NOTICE

This word is used for precautions that must be taken to avoid actions which could shorten the life of the machine.

REMARKS

This word is used for information that is useful to know.

Safety labels

Safety labels are affixed to the machine to inform the operator or maintenance worker on the spot when carrying out operation or maintenance of the machine that may involve hazard.

This machine uses "Safety labels using pictograms" to indicate safety procedures.

For details of safety labels, see "SAFETY LABELS (2-3)".

Safety labels using pictogram

Safety pictograms use a picture to express a level of hazardous condition equivalent to the signal word. These safety pictograms use pictures in order to let the operator or maintenance worker understand the level and type of hazardous condition at all times. Safety pictograms show the type of hazardous condition at the top or left side, and the method of avoiding the hazardous condition at the bottom or right side. In addition, the type of hazardous condition is displayed inside a triangle and the method of avoiding the hazardous condition is shown inside a circle.

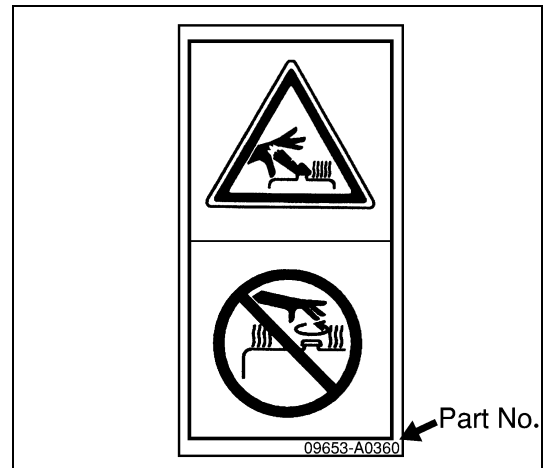
Komatsu cannot predict every circumstance that might involve a potential hazard in operation and maintenance. Therefore, the safety messages in this manual and on the machine may not include all possible safety precautions.

If any procedures or actions not specifically recommended or allowed in this manual are used, it is your responsibility to take the necessary steps to ensure safety.

In no event should you engage in prohibited uses or actions described in this manual.

The explanations, values, and illustrations in this manual were prepared based on the latest information available at that time. Continuing improvements in the design of this machine can lead to changes in detail which may not be reflected in this manual. Consult Komatsu or your Komatsu distributor for the latest available information of your machine or for questions regarding information in this manual.

The numbers in circles in the illustrations correspond to the numbers in () in the text. (For example: ① ->1)



INTRODUCTION

This loader is a machine with independent transmission, moving on chains or wheels. Driving in forward direction, the loader can load or dig material using its attachments intended for loading operations (i.e. bucket).

The standard operation cycle of a loader includes filling up and loading of the bucket, transporting the material and emptying the bucket.

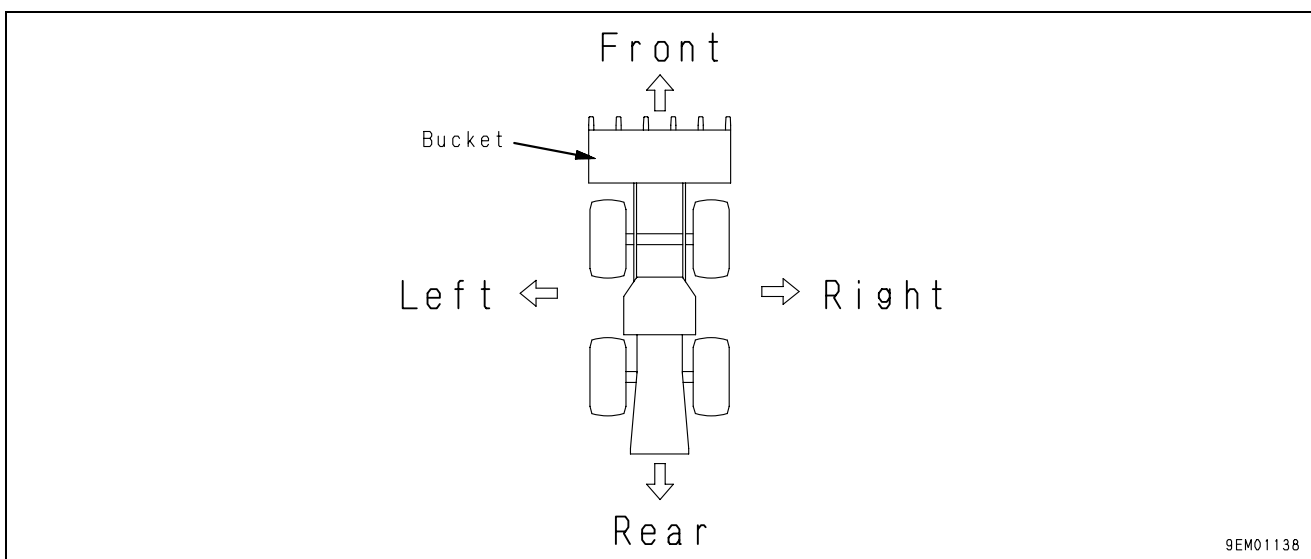
INTENDED USE

If you use the machine for any other purpose than specified above, we will not accept any responsibility for safety. All considerations concerning safety will then be up to the owner or the operating and maintenance personnel. In any case, neither you nor any other person are/is authorised to perform work and functions explicitly prohibited in these operating instructions.

The transport of persons in the work equipment is strictly forbidden!

For details of the operating procedure, see "WORK POSSIBLE USING WHEEL LOADER (3-100)".

DIRECTIONS OF MACHINE



9EM01138

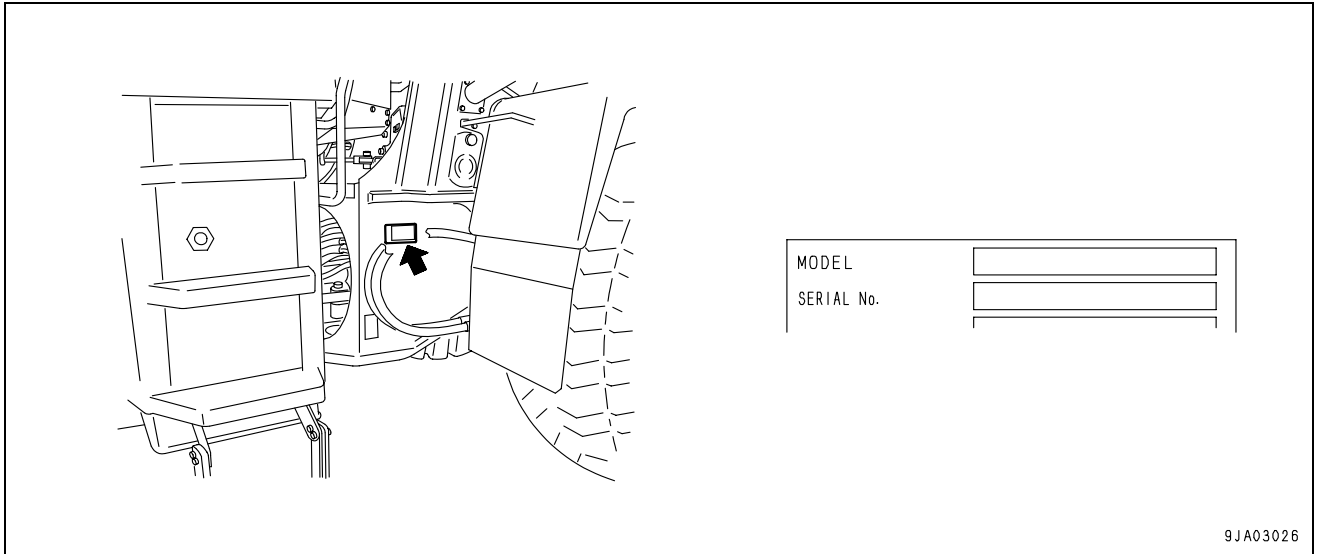
In this manual, the directions of the machine (front, rear, left, right) are determined according to the view from the operator's seat in the direction of travel (front) of the machine.

NECESSARY INFORMATION

When requesting service or ordering replacement parts, please inform your Komatsu distributor of the following items.

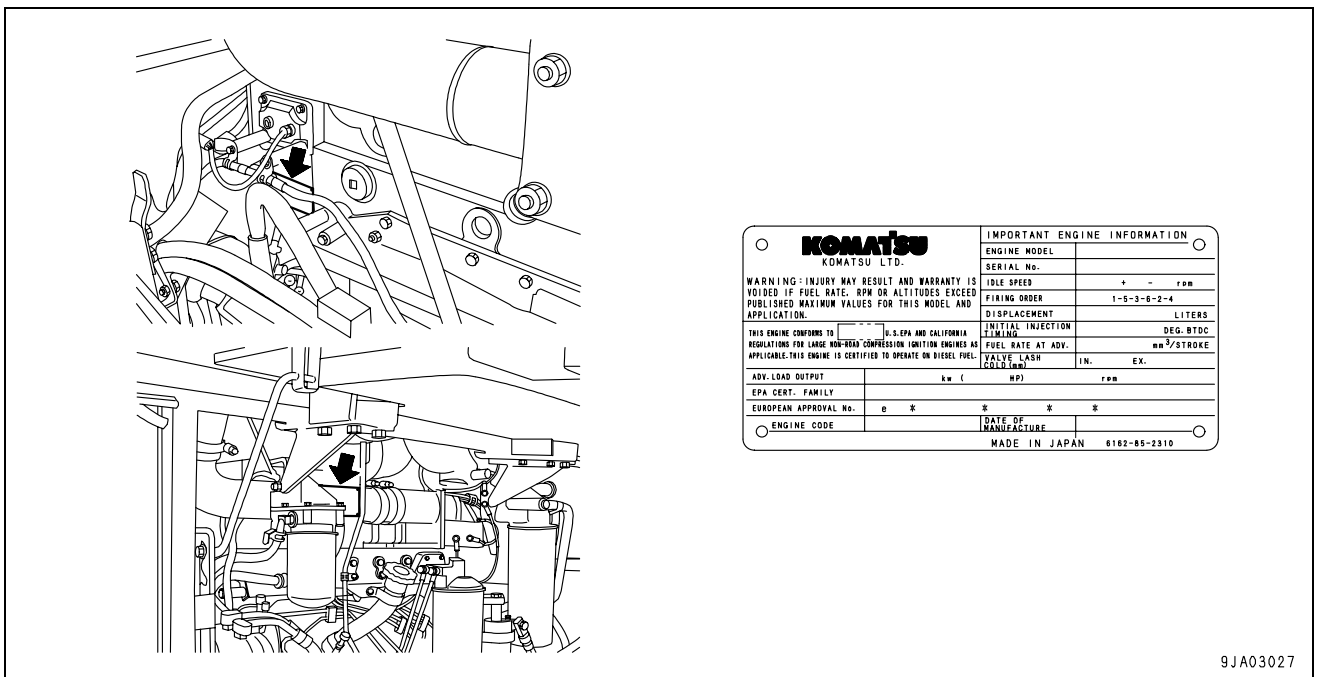
MACHINE SERIAL NO. PLATE AND POSITION

On the center right of the front frame.



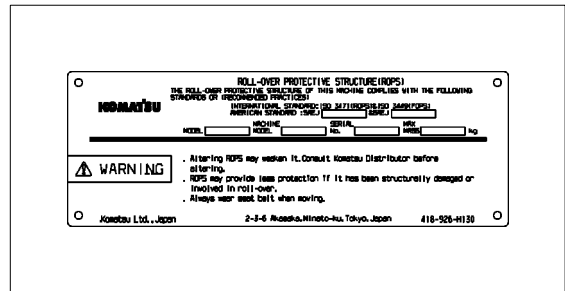
ENGINE SERIAL NO. PLATE AND POSITION

This is at the top of the side face of the engine of the cylinder block on the left side of the machine and on the muffler bracket on the right side of the machine.



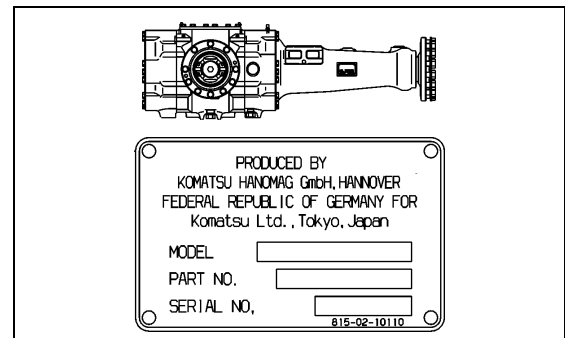
ROPS/FOPS-CAB SERIAL NO. PLATE

This plate is located on the right inside cab on the rear beam.



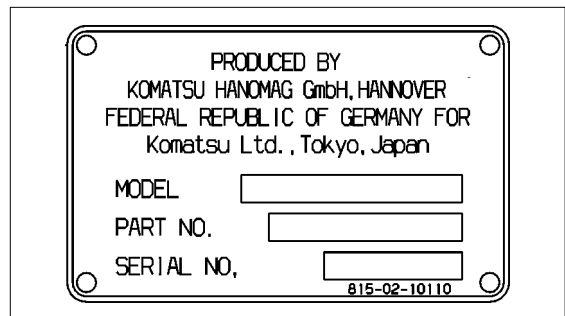
AXLE SERIAL NO. PLATE

This plate is located on the right of front axle and on the left of rear axle.



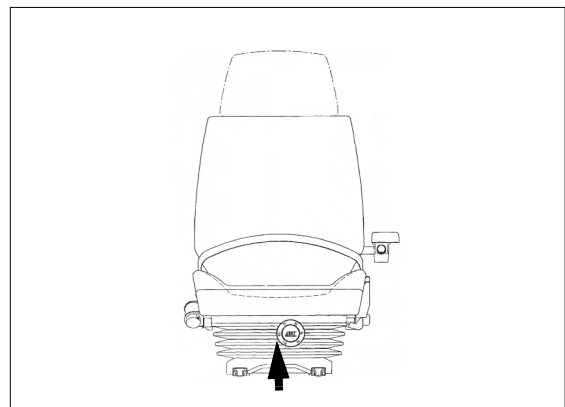
TRANSMISSION SERIAL NO. PLATE

This plate is located in travel direction front, above the transmission output.



SEAT OPERATOR SERIAL NO. PLATE

This plate is located in front of seat, covered by the bellows.



POSITION OF SERVICE METER

It is at the center bottom of the machine monitor.

For details of the service meter display, see SERVICE METER in EXPLANATION OF COMPONENTS “SERVICE METER (3-8)”.

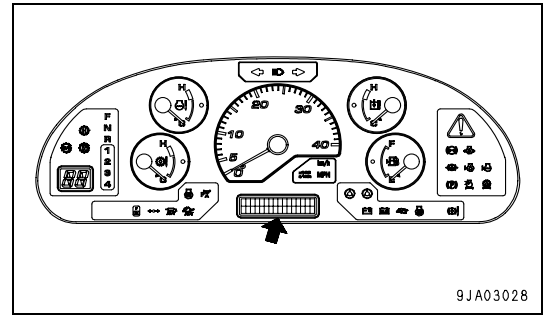


TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR

Machine serial No.	
Engine serial No.	
Distributor name	
Address	
Service Personal	
Phone/Fax	

CONTENTS

FOREWORD

FOREWORD	1-2
SAFETY INFORMATION	1-4
INTRODUCTION	1-6
INTENDED USE	1-6
DIRECTIONS OF MACHINE	1-6
NECESSARY INFORMATION	1-7
MACHINE SERIAL NO. PLATE AND POSITION	1-7
ENGINE SERIAL NO. PLATE AND POSITION	1-7
ROPS/FOPS-CAB SERIAL NO. PLATE	1-8
AXLE SERIAL NO. PLATE	1-8
TRANSMISSION SERIAL NO. PLATE	1-8
SEAT OPERATOR SERIAL NO. PLATE	1-8
POSITION OF SERVICE METER	1-9
TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR	1-9
CONTENTS	1-10
DIMENSIONS, WEIGHTS AND OPERATING DATA	1-17
WA470-5H: DIMENSIONS, WEIGHTS AND OPERATING DATA	1-17
CE-CONFORMING EQUIPMENT	1-18
CE-CONFORMING EQUIPMENT - PART 1	1-18
MANUFACTURER-SUPPLIED CE-CONFORMING EQUIPMENT, ACCORDING TO DOCUMENT 421-93- H1900	1-19
 SAFETY	
SAFETY LABELS	2-3
LOCATION OF SAFETY LABELS	2-3
SAFETY LABELS	2-4
GENERAL PRECAUTIONS	2-5
PRECAUTIONS FOR OPERATION	2-13
BEFORE STARTING ENGINE	2-13
OPERATION	2-14
TRANSPORTATION	2-21
BATTERY	2-22
TOWING	2-24
PRECAUTIONS FOR MAINTENANCE	2-25
PRECAUTIONS WITH TIRES	2-32

OPERATION

GENERAL VIEW	3-2
GENERAL VIEW OF MACHINE	3-2
GENERAL VIEW OF CONTROLS AND GAUGES	3-3
EXPLANATION OF COMPONENTS	3-6
MACHINE MONITOR	3-6
TYPES OF WARNING	3-7
CENTRAL WARNING LAMP	3-7
CHARACTER DISPLAY PORTION	3-8
EMERGENCY STOP ITEM	3-14
CAUTION ITEMS	3-17
INSPECTION AND MAINTENANCE ITEM	3-20
PILOT DISPLAY PORTION	3-24
METER DISPLAY PORTION	3-29
OTHER FUNCTIONS OF MACHINE MONITOR	3-31
SWITCHES	3-36
CONTROL LEVERS, PEDALS	3-51
STEERING TILT LOCK LEVER	3-57
CAP WITH LOCK	3-58
METHOD OF OPENING AND CLOSING CAP WITH LOCK (FOR THE FUEL TANK FILLER PORT)	3-58
METHOD OF OPENING AND CLOSING CAP WITH LOCK (FOR THE HYDRAURIC TANK FILLER PORT)	3-59
SAFETY BAR	3-60
TOWING PIN	3-60
GREASE PUMP	3-60
CAB DOOR OPEN LOCK	3-61
CAB WINDOW OPEN LOCK CANCEL KNOB	3-61
BACKUP ALARM	3-61
FUSE	3-62
FUSE CAPACITY AND NAME OF CIRCUIT	3-63
SLOW-BLOW FUSE	3-64
TAKING OFF POWER	3-64
HANDLING CAB WIPER	3-65
PREVENTING DAMAGE TO WIPER ARM BRACKET	3-65
DUST INDICATOR	3-65
OPERATION	3-66
CHECK BEFORE STARTING ENGINE, ADJUST	3-66
WALK-AROUND CHECK	3-66
CHECK BEFORE STARTING	3-69
ADJUSTMENT	3-74
OPERATIONS AND CHECKS BEFORE STARTING ENGINE	3-79
STARTING ENGINE	3-81
AUTOMATIC WARMING-UP OPERATION	3-83
OPERATIONS AND CHECKS AFTER STARTING ENGINE	3-84
BREAKING IN THE MACHINE	3-84
NORMAL OPERATION	3-84
STOPPING ENGINE	3-86
CHECK AFTER STOPPING ENGINE	3-86
MOVING MACHINE OFF (DIRECTIONAL, SPEED), STOPPING	3-87
PREPARATIONS FOR MOVING MACHINE	3-87
CHANGING GEAR SPEED	3-90
CHANGING DIRECTION	3-91
STOPPING MACHINE	3-93
TURNING	3-96
EMERGENCY STEERING	3-96

OPERATION OF WORK EQUIPMENT 3-98

WORK POSSIBLE USING WHEEL LOADER 3-100

 DIGGING OPERATIONS 3-100

 LEVELING OPERATIONS 3-104

 PUSHING OPERATION 3-104

 LOAD AND CARRY OPERATIONS 3-104

 LOADING OPERATIONS 3-105

PRECAUTIONS FOR OPERATION 3-107

 PERMISSIBLE WATER DEPTH 3-107

 IF WHEEL BRAKE DOES NOT WORK 3-107

 PRECAUTIONS WHEN DRIVING UP OR DOWN SLOPES 3-107

 PRECAUTIONS REGARDING BRAKE FUNCTION 3-108

ADJUSTING WORK EQUIPMENT POSTURE 3-109

 ADJUSTING BOOM KICKOUT 3-109

 ADJUSTING BUCKET POSITIONER 3-111

 BUCKET LEVEL INDICATOR 3-111

PARKING MACHINE 3-112

CHECKS AFTER COMPLETION OF OPERATION 3-114

LOCKING 3-114

HANDLING THE TIRES 3-115

 PRECAUTIONS WHEN HANDLING TIRES 3-115

 TIRE PRESSURE 3-115

 PRECAUTIONS WHEN LOAD AND CARRY METHOD 3-116

TRANSPORTATION 3-117

 TRANSPORTATION PROCEDURE 3-117

 LOADING, UNLOADING WORK WITH TRAILERS 3-117

 LOADING 3-117

 SECURING MACHINE 3-118

 UNLOADING 3-118

 LIFTING MACHINE 3-119

 POSITION FOR STICKING LIFTING POSITION MARK 3-120

 WEIGHT TABLE 3-120

 LIFTING PROCEDURE 3-121

COLD WEATHER OPERATION 3-122

 PRECAUTIONS FOR LOW TEMPERATURE 3-122

 FUEL AND LUBRICANTS 3-122

 COOLANT 3-122

 BATTERY 3-123

 PRECAUTIONS AFTER COMPLETION OF WORK 3-123

 AFTER COLD WEATHER 3-123

 WARMING-UP OPERATION FOR STEERING HYDRAURIC CIRCUIT IN COLD WEATHER 3-124

LONG-TERM STORAGE 3-125

 BEFORE STORAGE 3-125

 DURING STORAGE 3-125

 AFTER STORAGE 3-125

TROUBLESHOOTING 3-126

 WHEN MACHINE RUNS OUT OF FUEL 3-126

 TOWING THE MACHINE 3-127

 WHEN ENGINE CAN BE USED 3-128

 WHEN ENGINE CANNOT BE USED 3-128

 RELEASING PARKING BRAKE 3-128

 EMERGENCY TRAVEL OPERATION 3-130

 IF BATTERY IS DISCHARGED 3-131

 REMOVAL AND INSTALLATION OF BATTERY 3-131

 PRECAUTIONS FOR CHARGING BATTERY 3-132

STARTING ENGINE WITH BOOSTER CABLE.....	3-132
OTHER TROUBLE	3-134
ELECTRICAL SYSTEM.....	3-134
CHASSIS.....	3-135
ENGINE.....	3-137

MAINTENANCE

GUIDES TO MAINTENANCE	4-2
OUTLINES OF SERVICE	4-4
OUTLINE OF OIL, FUEL, COOLANT	4-4
OIL	4-4
FUEL.....	4-4
COOLANT.....	4-4
GREASE	4-5
CARRYING OUT KOWA (Komatsu Oil Wear Analysis)	4-5
STORING OIL AND FUEL.....	4-6
FILTERS	4-6
OUTLINE OF ELECTRIC SYSTEM.....	4-6
WEAR PARTS LIST	4-7
THE PARTS IN PARENTHESES ARE TO BE REPLACED AT THE SAME TIME	4-7
LUBRICANTS AND OPERATING MEANS	4-8
LUBRICATION CHART	4-8
LUBRICANTS, FUELS AND FILLING CAPACITIES	4-9
STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS	4-13
TORQUE LIST	4-13
PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS	4-14
MAINTENANCE SCHEDULE CHART	4-15
MAINTENANCE SCHEDULE CHART	4-15
SERVICE PROCEDURE	4-17
INITIAL 250 HOURS SERVICE	4-17
WHEN REQUIRED	4-18
CHECK, CLEAN, OR REPLACE AIR CLEANER ELEMENT	4-18
CLEAN INSIDE OF COOLING SYSTEM.....	4-21
CHECK TRANSMISSION OIL LEVEL, ADD OIL.....	4-24
CHECK AXLE OIL LEVEL, ADD OIL.....	4-25
CHECK AXLE CASE BREATHER.....	4-26
CLEAN CONDENSER OF AIR CONDENSER	4-26
CHECK WINDOW WASHING FLUID LEVEL, ADD FLUID	4-27
CLEAN RADIATOR FINS AND COOLER FINS	4-28
CHECK ELECTRICAL INTAKE AIR HEATER.....	4-31
REPLACE BOLT ON CUTTING EDGE	4-31
REPLACE BUCKET TEETH.....	4-32
CHECK AIR CONDITIONER	4-33
REPLACE SLOW BLOW FUSE	4-34
SELECTION AND INSPECTION OF TIRES	4-35
CHECK BEFORE STARTING	4-37
EVERY 50 HOURS SERVICE	4-38
DRAIN WATER, SEDIMENT FROM FUEL TANK.....	4-38
EVERY 100 HOURS SERVICE	4-39
CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL.....	4-39

CLEAN ELEMENT IN AIR CONDITIONER FRESH AIR FILTER.....	4-40
EVERY 250 HOURS SERVICE	4-41
CHECK ENGINE ELECTROLYTE LEVEL	4-41
CHECK PARKING BRAKE	4-42
CHECK ALTERNATOR BELT TENSION, ADJUST	4-43
CHECK AIR CONDITIONER COMPRESSOR BELT TENSION, ADJUST	4-44
CHECK FOR LOOSE WHEEL HUB NUTS, TIGHTEN.....	4-44
CLEAN ELEMENT IN AIR CONDITIONER RECIRCULATION FILTER.....	4-45
EVERY 500 HOURS SERVICE	4-46
CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE	4-46
REPLACE FUEL FILTER CARTRIDGE	4-47
CLEAN FUEL STRAINER.....	4-49
EVERY 1000 HOURS SERVICE	4-50
CHANGE OIL IN TRANSMISSION CASE AND TRANSMISSION OIL FILTER CARTRIDGE, CLEAN STRAINER.....	4-50
CLEAN TRANSMISSION CASE BREATHER	4-51
CHECK TIGHTENING PARTS OF TURBOCHARGER	4-51
CHECK PLAY OF TURBOCHARGER ROTOR.....	4-51
REPLACE CORROSION RESISTOR CARTRIDGE	4-51
EVERY 2000 HOURS SERVICE	4-52
CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT	4-52
REPLACE HYDRAULIC TANK BREATHER ELEMENT	4-54
CHANGE AXLE OIL.....	4-55
REPLACE ELEMENT IN AIR CONDITIONER RECIRCULATION AIR FILTER, FRESH AIR FILTER	4-55
CLEAN PPC CIRCUIT STRAINER.....	4-56
CLEAN ENGINE BREATHER ELEMENT.....	4-56
CHECK ALTERNATOR, STARTING MOTOR	4-56
CHECK ENGINE VALVE CLEARANCE, ADJUST	4-56
CLEAN AND CHECK TURBOCHARGER	4-56
CHECK INJECTOR	4-57
CHECK ACCUMULATOR GAS PRESSURE	4-57
CHECK VIBRATION DAMPER.....	4-57
CHECK BRAKE DISC WEAR.....	4-58
EVERY 4000 HOURS SERVICE	4-59
LUBRICATING.....	4-59
CHECK WATER PUMP	4-59
CHECK AIR CONDITIONER COMPRESSOR, ADJUST	4-60
CHECK INJECTOR NOZZLE TIP.....	4-60
CHECKING FOR LOOSENESS OF HIGH-PRESSURE CLAMP, HARDENING OF RUBBER	4-60
CHECKING FOR MISSING FUEL SPRAY PREVENTION CAP, HARDENING OF RUBBER.....	4-61
EVERY 8000 HOURS SERVICE	4-62
REPLACE HIGH-PRESSURE PIPING CLAMP.....	4-62
REPLACE FUEL SPRAY PREVENTION CAP	4-62
CHECK INJECTOR NOZZLE TIP, REPLACE IF NECESSARY	4-62

TECHNICAL DATA

TECHNICAL DATA	5-2
NOISE EMISSION LEVELS	5-4
VIBRATION LEVEL.....	5-4
LIMIT VALUES FOR SLOPES	5-5

ATTACHMENTS, OPTIONS

HANDLING LOAD METER	6-2
GENERAL LOCATIONS	6-2
MACHINE MONITOR WITH LOAD METER	6-2
SWITCHES	6-3
LOAD METER FUNCTIONS	6-4
HANDLING LOAD METER DISPLAY	6-7
SETTING ADDITION MODE	6-7
SETTING REMAIN MODE	6-9
TOTAL LOAD DATA DISPLAY	6-12
STOPPING CALCULATION	6-14
CARRYING OUT CALIBRATION (ADJUSTING 0 POINT) WHEN EMPTY	6-15
CARRYING OUT CALIBRATION (ADJUSTING 0 POINT) WHEN LOADED	6-17
SUBTRACTION FUNCTION	6-20
METHOD OF SETTING TIME ON CLOCK	6-22
PRINTER OUTPUT	6-24
PRINTOUT MODE	6-24
METHOD OF SELECTING PRINTOUT MODE	6-25
HANDLING TORQUE CONVERTER LOCK-UP	6-27
GENERAL LOCATIONS	6-27
METHOD OF OPERATION	6-28
WARNING/LIMIT FUNCTIONS FOR TRAVEL SPEED	6-29
AIR CONDITIONER	6-30
GENERAL LOCATIONS AND FUNCTION OF CONTROL PANEL	6-30
METHOD OF OPERATION	6-33
PRECAUTIONS WHEN USING	6-34
HANDLING AUTOMATIC AIR-CONDITIONER	6-35
GENERAL LOCATIONS AND FUNCTIONS OF CONTROL PANEL	6-35
METHOD OF OPERATION	6-39
PRECAUTIONS WHEN USING	6-41
INSPECTION AND MAINTENANCE	6-41
CENTRAL LUBRICATION	6-42
OPERATION	6-42
DISPLAY AND CONTROL UNIT	6-43
LED-DISPLAY	6-43
PUSHBUTTONS	6-43
CHANGING THE LUBRICATION INTERVAL TIMES	6-44
HANDLING JOYSTICK STEERING SYSTEM	6-45
EXPLANATION OF COMPONENTS	6-45
SHIFT UP, SHIFT DOWN SWITCHES	6-45
FNR SWITCH	6-46
JOYSTICK STEERING LEVER	6-46
JOYSTICK ON/OFF SWITCH	6-46
HI/LOW SELECTOR SWITCH	6-46
HORN SWITCH	6-47
CONSOLE LOCK LEVER	6-47
HEIGHT ADJUSTMENT LOCK LEVER	6-47
ANGLE, FORE/AFT ADJUSTMENT LOCK LEVER	6-47
STRUCTURE AND FUNCTION OF JOYSTICK STEERING	6-47
GETTING IN OR OUT OF OPERATOR'S CAB	6-49
ADJUSTMENT OF JOYSTICK CONSOLE	6-49
OPERATION METHOD OF JOYSTICK STEERING SYSTEM	6-50

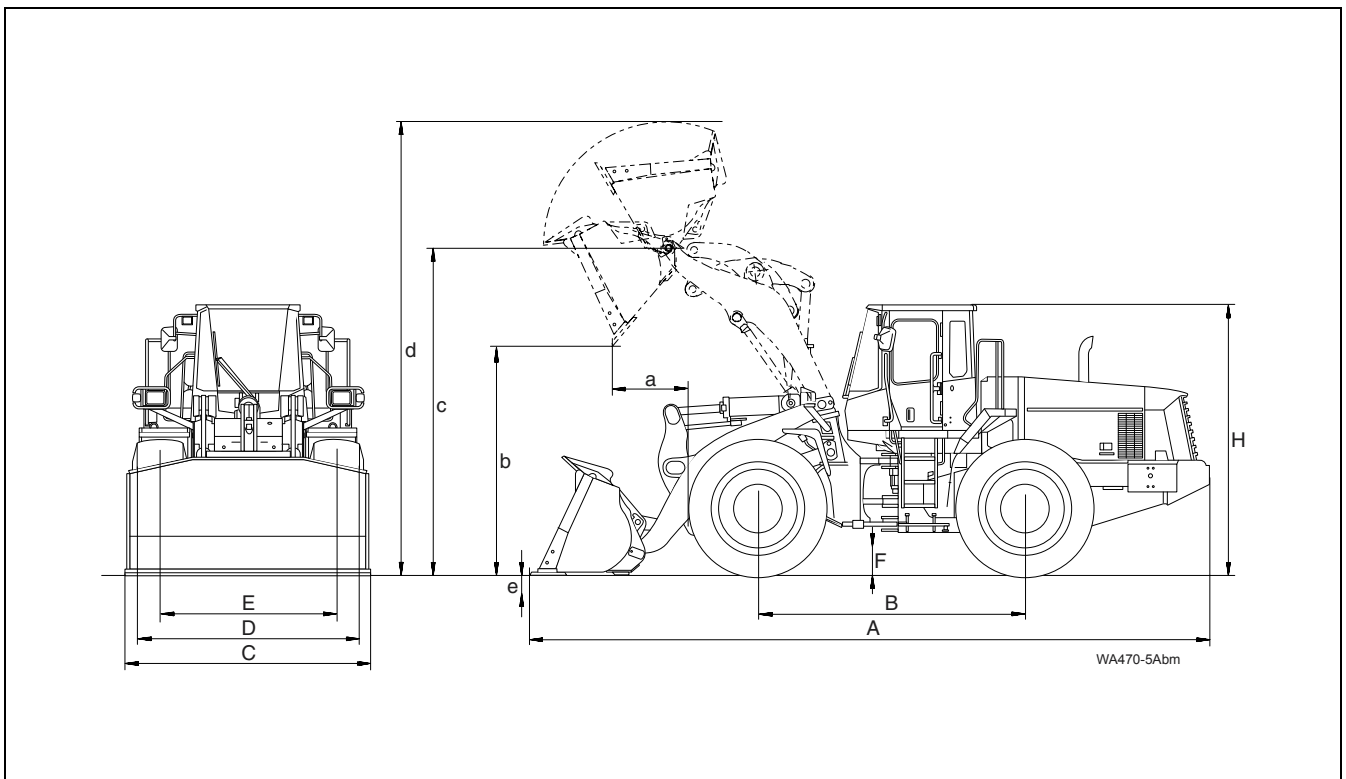
INDEX 7-1

NOTES

NOTES..... 8-2

DIMENSIONS, WEIGHTS AND OPERATING DATA

WA470-5H: DIMENSIONS, WEIGHTS AND OPERATING DATA



Measurements, operating data

	Bucket capacity to ISO 7546	m³	4,1	
	Material density	t/m ³	1,8	
	Bucket weight without teeth	kg	1.690	
	Static tipping load, straight	kg	18.400	
	Static tipping load, 40° angle	kg	16.520	
	Breakout force, hydraulic	kN	184	
	Lifting capacity, hydraulic, on ground	kN	238	
	Operating weight *)	kg	23.200	
a	Reach at 45° discharge	mm	1.325	
b	Dumping height at 45° discharge	mm	3.132	
c	Lift height, hinge pin	mm	4.341	
d	Height to upper edge of bucket	mm	6.017	
e	Digging depth	mm	63	
A	Overall length, bucket on ground	mm	8.862	
B	Wheel base	mm	3.450	
C	Bucket width	mm	3.000	These values refer to machines with 26,5 R25 XHA
D	Width over tyres	mm	2.915	
E	Gauge	mm	2.240	
F	Ground clearance	mm	581	*) Machine without additional counterweight
H	Overall height	mm	3.538	

CE-CONFORMING EQUIPMENT

CE-CONFORMING EQUIPMENT - PART 1

CE-conforming equipment

	1	2	3	4	5	-
	Type	Part No.	Volume m ³	Load Capacity kg	Hydraulic pressure bar	Weight kg
Bucket	WA470-5H	421-70-H2B20	6,0			-
		421-70-H2B60	3,8			2.050
		421-70-H2B71	3,8			2.215
		421-70-H2E52	4,35			2.186
		421-70-H2E63	4,35			2.328
		421-70-H2E73	4,75			2.450
		421-70-H2E84	4,75			2.590
		421-70-H2E91	4,35			2.340
		421-70-H2F92	4,75			2.542
		421-70-H2G71	4,5			2.349
		421-70-H2G82	4,9			2.712
		421-70-H2K52	4,2			2.107
		421-70-H2K62	4,2			2.243
		421-70-H2K73	4,6			2.360
		421-70-H2K84	4,6			2.590
		421-70-H2P12	4,1			2.340
		421-70-H2P22	4,1			2.480
		421-70-H2P31	4,25			2.549
		421-70-H2S02	4,1			2.350
		421-70-H2S12	4,1			2.485
		421-70-H2S21	4,25			2.559
		421-71-H2001	4,1			1.750
		421-71-H2010	4,25			1.915
		421-71-H2C40	4,1			1.690
		421-71-H2D31	4,5			1.951
421-71-H2E20	4,5			1.890		
421-71-H2E30	4,65			2.135		

KOMATSU HANOMAG
KOMATSU HANOMAG GmbH, HANNOVER-GERMANY

Typ Type	①		
Teile Nr. Part number	②		
Volumen Volume	③	m ³	m ³
Tragfähigkeit Load capacity	④	kg	kg
Hydr. Druck Hydr. pressure	⑤	bar	bar

GK100392-A

MANUFACTURER-SUPPLIED CE-CONFORMING EQUIPMENT, ACCORDING TO DOCUMENT 421-93-H1900

The responsibility for observing valid regulations in the case of wheel loaders with "interchangeable equipment" (e.g. bucket or fork-lift) which was not supplied from works lies with the customer which was subsequently fitted to the machine.

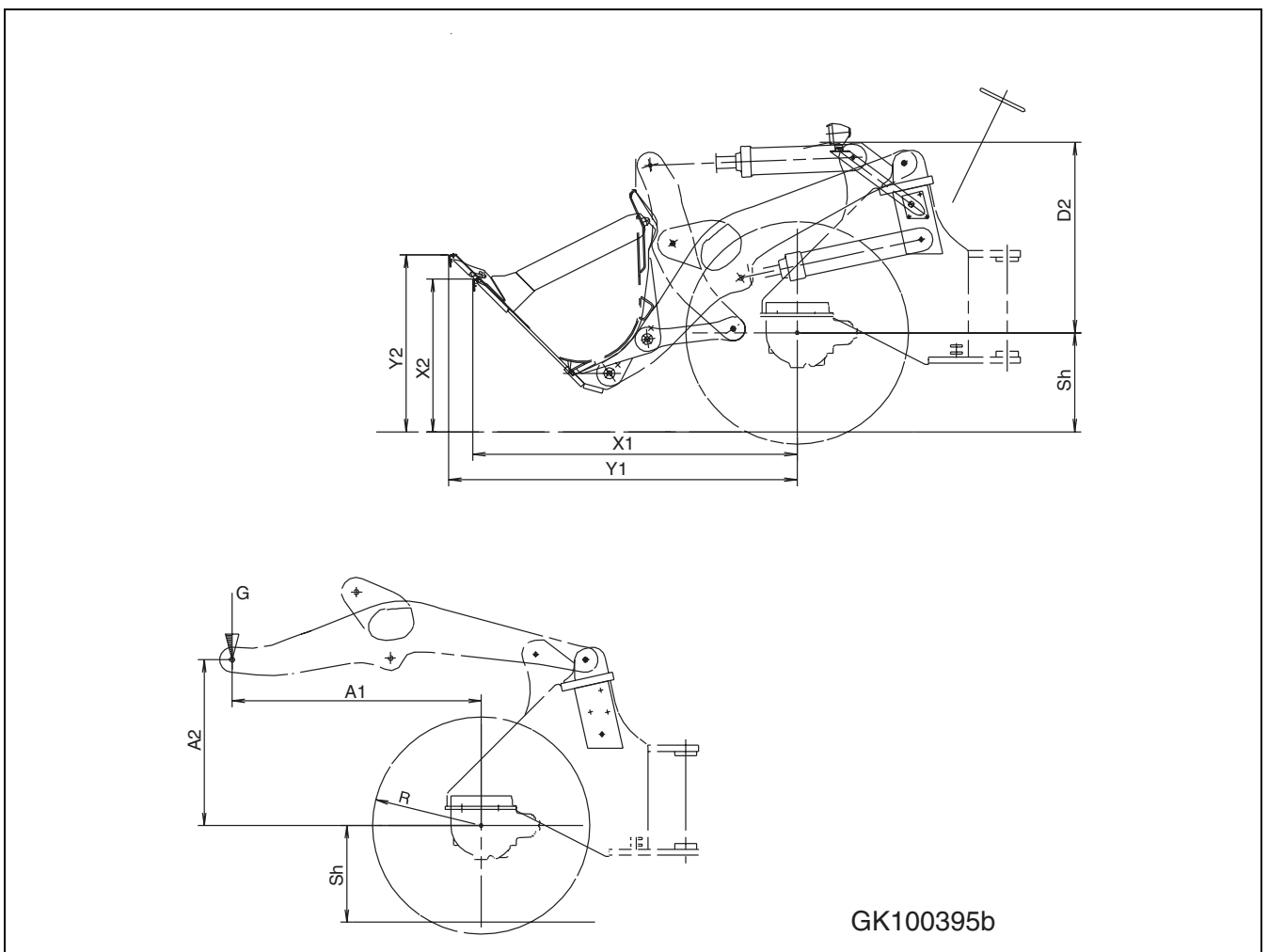
The directives for CE conformity and road-traffic registration are deemed to have been fulfilled when the manufacturer of the equipment confirms fulfilment of the form 421-93-H1900 alongside.

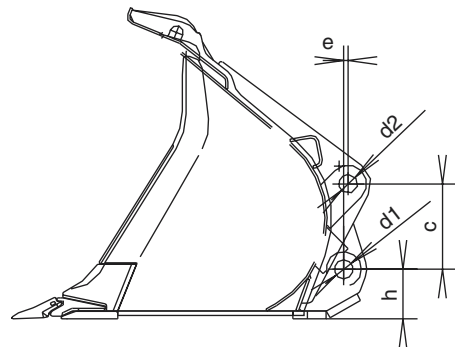
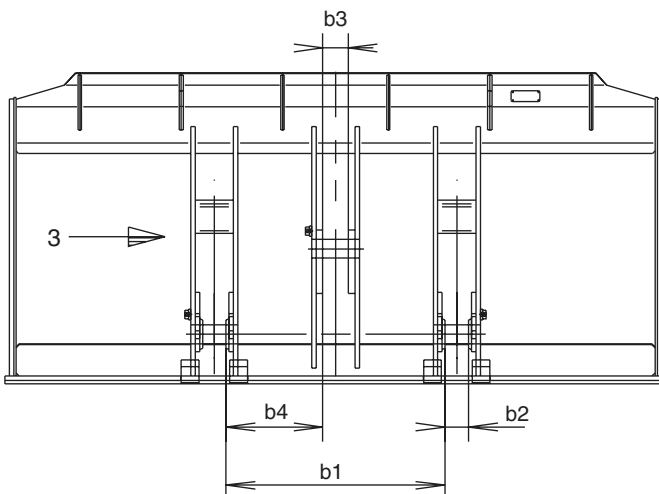
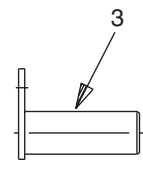
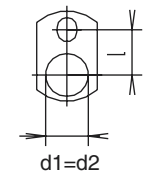
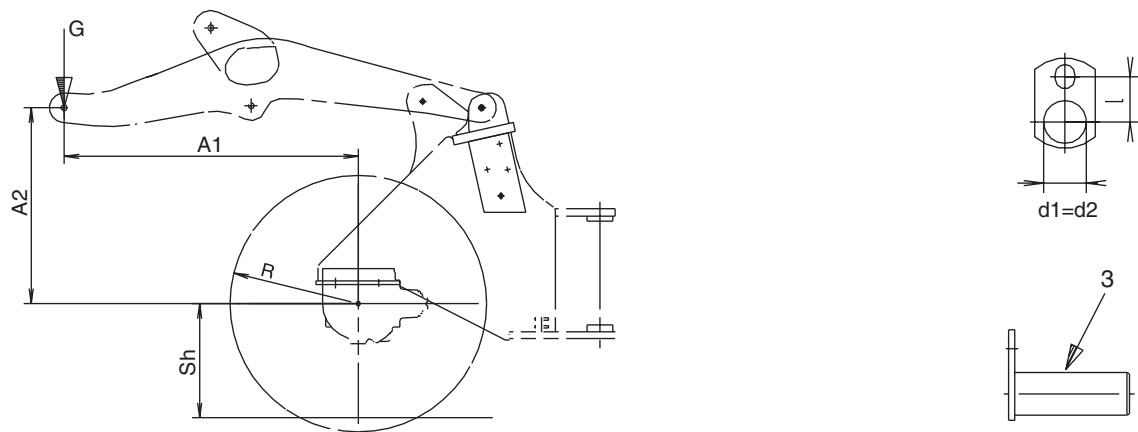
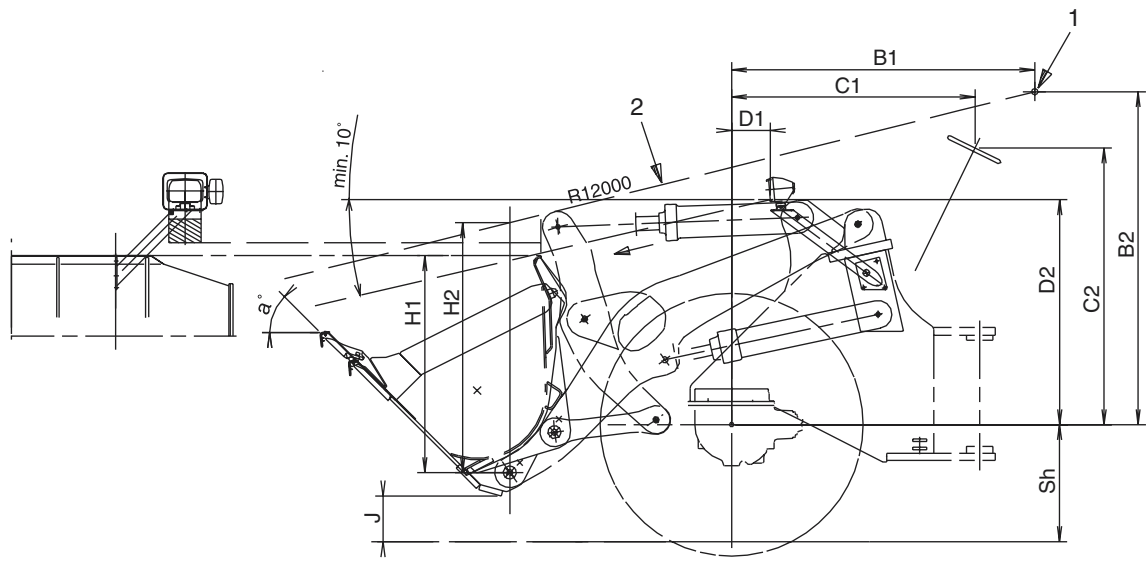
The certification must be sent to the customer and the wheel loader manufacturer. The CE conformity declaration for a specific wheel loader is only legally valid once this has taken place.

The dimensions X1, X2, Y1 and Y2 must be provided by the customer for approval for use on public roads. (valid in Germany)

The dimension Sh (smallest tyre radius) must be added to the dimension D2.

The figure G (in kg) represents the maximum load (equipment and operating load) which may act upon this point.





GK100395

MANUFACTURER- SUPPLIED CE-CONFORMING EQUIPMENT, ACCORDING TO DOCUMENT 421-93-H1900

- A1 Distance: bucket pivoting point - front axle, horizontal
- A2 Distance: bucket pivoting point - front axle, vertical
- Sh Distance: road level - front axle
- B1 Distance: driver's eye (1) - front axle, horizontal
- B2 Distance: driver's eye (1) - front axle, vertical
- C1 Distance: centre steering wheel - centre front axle, horizontal
- C2 Distance: center steering wheel - centre front axle, vertical
- D1 Distance: headlight - centre front axle, horizontal
- D2 Distance: headlight - centre front axle, vertical
- G Weight of equipment and working load
- H1 Distance: bucket pivoting point - bucket upper edge, vertical (carrying position)
- H2 Distance: bucket pivoting point - vision line, vertical (carrying position)
- J Distance: road level - bucket bottom edge (carrying position)
- X1 Distance: cutter protection - front axle, horizontal
- X2 Distance: cutter protection - road level, vertical
- Y1 Distance: teeth protection - front axle, horizontal
- Y2 Distance: teeth protection - road level, vertical
- b1 Bucket connection dimension, boom width inside
- b2 Bucket connection dimension, boom arm
- b3 Bucket connection dimension, tilt rod
- b4 Bucket connection dimension, temporary size
- c Bucket connection dimension between d1 and d2, vertical
- d1 Bucket connection dimension, bolt (3) for boom
- d2 Bucket connection dimension, bolt (3) for tilt rod
- e Bucket connection dimension d1 - d2, horizontally displaced
- h Distance: bucket bottom edge - boom bolt hole
- l Distance: centre of bolt -- centre of fastening screw

WA470-5H	421-93-H1900
A1	2245
A2	1345
Sh	809
B1	2100
B2	2201
C1	1665
C2	1801
D1	486
D2	1447
G	9800
H1	1675
H2	1643
J	270
X1	2957
X2	1268
Y1	3152
Y2	1459
b1	1038
b2	122
b3	143
b4	447.5
c	400
d1	95
d2	95
e	0
h	240
l	90
1	Driver's eye
2	Vision line
3	Bolts
Tyres	MICHELIN 26.5R25 XHA
Bucket	4.2 m ³ 421-70-H2K62

SAFETY

WARNING

Please read and make sure that you fully understand the precautions described in this manual and the safety labels on the machine. When operating or servicing the machine, always follow these precautions strictly.

SAFETY LABELS

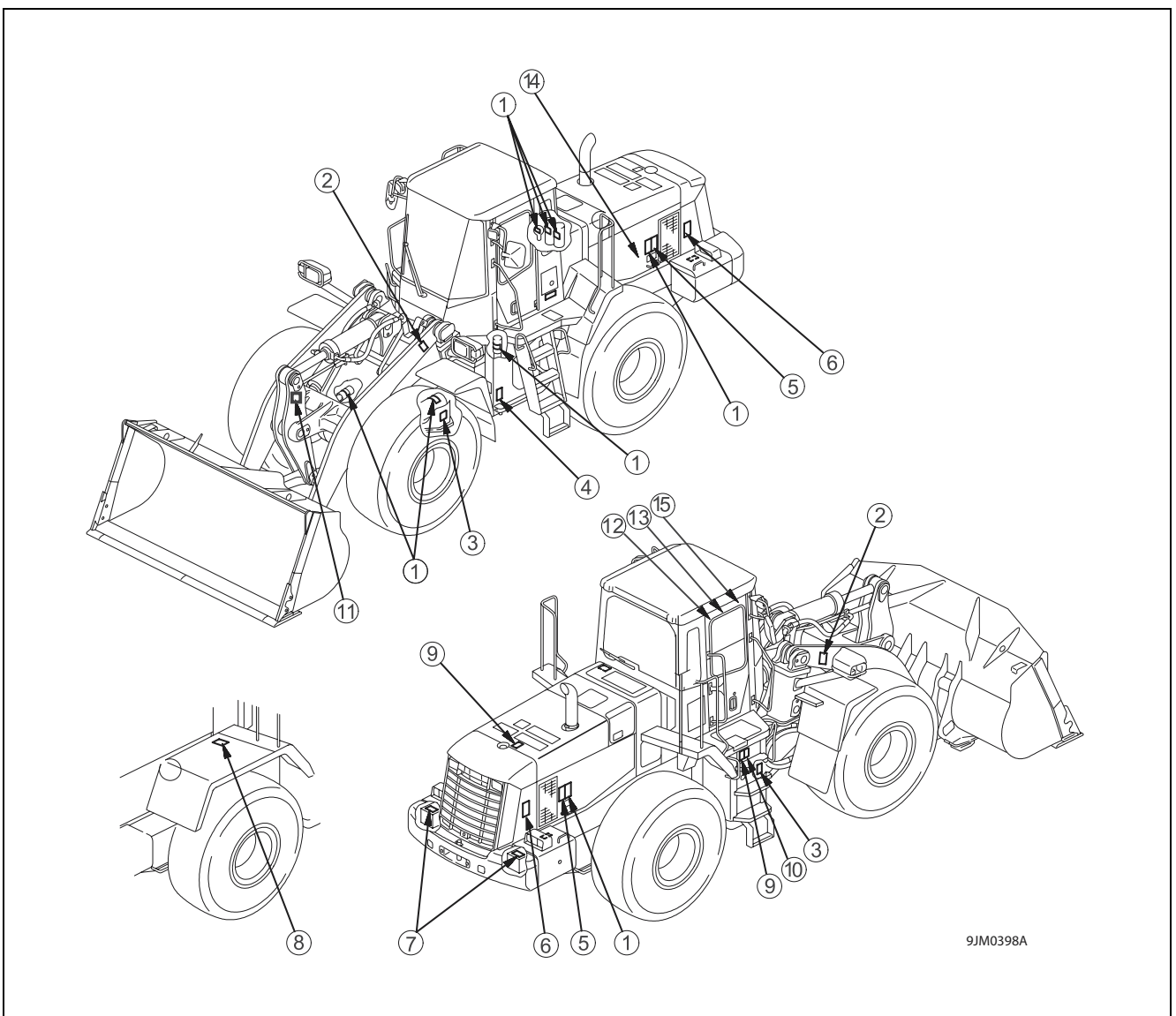
The following safety labels are used on this machine. Be sure that you fully understand the correct position and content of these safety labels.

To ensure that the content of these safety labels can be read properly, be sure that they are in the correct place and always keep them clean. When cleaning them, use soap and water. Do not use organic solvents or gasoline. These may cause the safety labels to peel off.

If the safety labels are damaged or lost, or cannot be read, replace them with new parts. For details of the part numbers, see this manual or check on the actual part, and order the new part from your Komatsu distributor.

There are also other labels in addition to the safety labels. Handle these labels in the same way.

LOCATION OF SAFETY LABELS

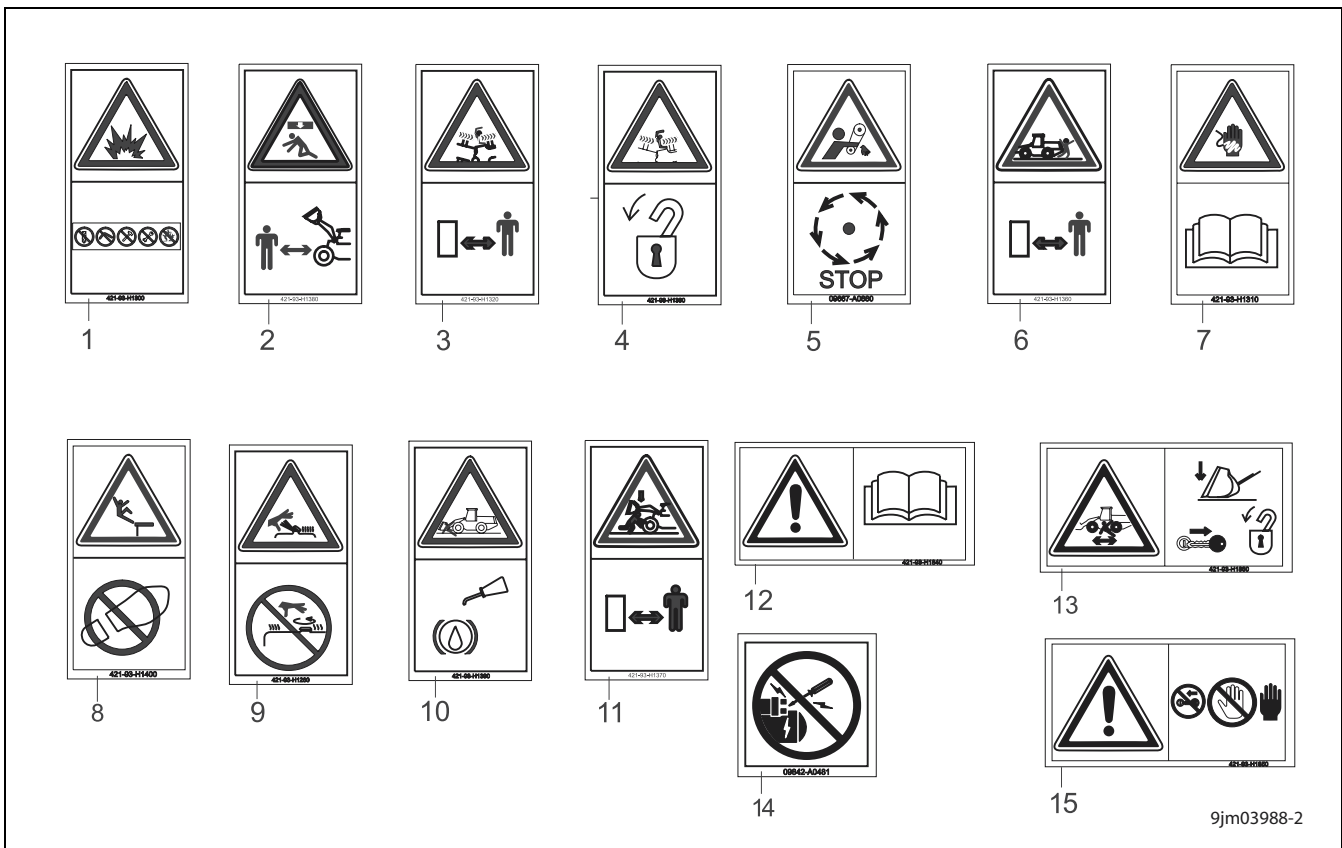


9JM0398A

The rear full fender is available only as an option, so (8) indicates only machines with equipped with full fender.

SAFETY LABELS

- | | | | |
|---|--|----|--|
| 1 | Danger of explosion due to pressure accumulator
P/N: 421-93-H1300 | 8 | Do not stand on fender
P/N: 421-93-H1400 |
| 2 | Keep a safe distance to the bucket cylinder
P/N: 421-93-H1380 | 9 | Caution, hot water/oil
P/N: 421-93-H1280 |
| 3 | Keep a safe distance to the machine's articulated joint
P/N: 421-93-H1320 | 10 | Use Komatsu oil only
P/N: 421-93-H1390 |
| 4 | Secure articulated joint during transport or when loading
P/N: 421-93-H1330 | 11 | Keep a safe distance to the attachments
P/N: 421-93-H1370 |
| 5 | Do not open when engine is running
P/N: 09667-A0880 | 12 | Instructions prior to operation/maintenance
P/N: 421-93-H1840 |
| 6 | Do not stand too close to the machine
P/N: 421-93-H1360 | 13 | Precautionary measures when leaving the machine
P/N: 421-93-H1860 |
| 7 | Caution when using jump leads
P/N: 421-93-H1310 | 14 | Only start machine from driver's seat
P/N: 0942-A0481 |
| | | 15 | Safety measures before starting work
P/N: 421-93-H1850 |



GENERAL PRECAUTIONS

SAFETY RULES

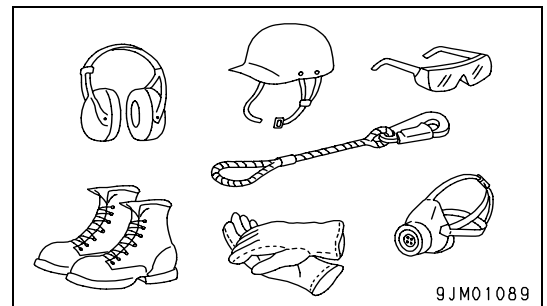
- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- If you are under the influence of alcohol or medication, your ability to safely operate or repair your machine may be severely impaired putting yourself and everyone else on your jobsite in danger.
- When working with another operator or with a person on worksite traffic duty, be sure that all personnel understand all hand signals that are to be used.

IF ABNORMALITIES ARE FOUND

If you find any abnormality in the machine during operation or maintenance (noise, vibration, smell, incorrect gauges, smoke, oil leakage, etc., or any abnormal display on the warning devices or monitor), report to the person in charge and have the necessary action taken. Do not operate the machine until the abnormality has been corrected.

CLOTHING AND PERSONAL PROTECTIVE ITEMS

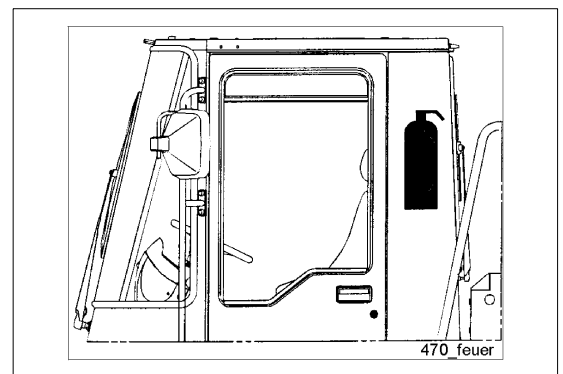
- Do not wear loose clothing and accessories. There is a hazard that they may catch on control levers or other protruding parts.
- If you have long hair and it hangs out from your hard hat, there is a hazard that it may get caught up in the machine, so tie your hair up and be careful not to let it get caught.
- Always wear a hard hat and safety shoes. If the nature of the work requires it, wear safety glasses, mask, gloves, ear plugs, and safety belt when operating or maintaining the machine.
- Check that all protective equipment functions properly before using it.



FIRE EXTINGUISHER AND FIRST AID KIT

Always follow the precautions below to prepare for action if any injury or fire should occur.

- The fire extinguisher is located on the rear cab frame on the left inside the operator's cab. Two fasteners are provided on the lower left strut of the cab for fastening the fire extinguisher in place.
- If, in the course of certain operations, there is danger of fire, fire extinguishers must be at hand. Familiarise with the use of the fire extinguishers.
- Inform yourself on measures to be taken in the event of a fire.
- The first-aid kit is located in the compartment under the driver's seat.

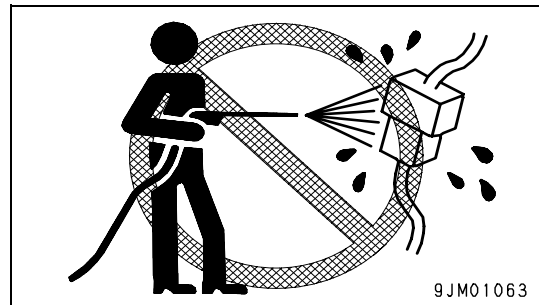


SAFETY FEATURES

- Be sure that all guards and covers are in their proper position. Have guards and covers repaired immediately if they are damaged.
- Understand the method of use of safety features and use them properly.
- Never remove any safety features. Always keep them in good operating condition.

KEEP MACHINE CLEAN

- If water gets into the electrical system, there is a hazard that it will cause malfunctions or misoperation. Do not use water or steam to wash the electrical system (sensors, connectors).
- If inspection and maintenance is carried out when the machine is still dirty with mud or oil, there is a hazard that you will slip and fall, or that dirt or mud will get into your eyes. Always keep the machine clean.

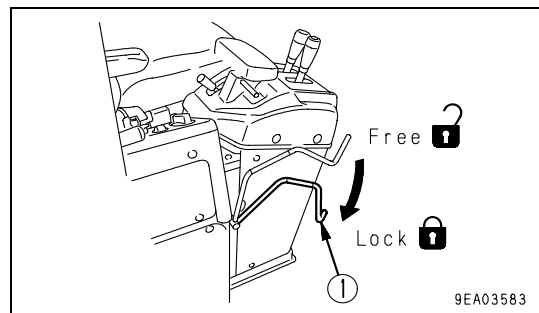


INSIDE OPERATOR'S COMPARTMENT

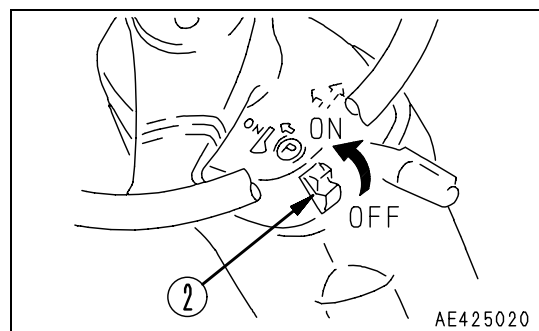
- When entering the operator's compartment, always remove all mud and oil from the soles of your shoes. If you operate the pedal with mud or oil affixed to your shoes, your foot may slip and this may cause a serious accident.
- Do not leave parts or tools lying around the operator's compartment.
- Do not stick suction pads to the window glass. Suction pads act as a lens and may cause fire.
- Do not use cellular telephones inside the operator's compartment when driving or operating the machine.
- Never bring any dangerous objects such as flammable or explosive items into the operator's cab.

ALWAYS APPLY LOCK WHEN LEAVING OPERATOR'S SEAT

- Before standing up from the operator's seat to adjust the operator's seat, always lower the work equipment, set safety lock lever (1) to the LOCK position and parking brake switch (2) to the ON position, then stop the engine. If you accidentally touch the travel or swing lever when they are not locked. The work equipment may suddenly move and cause serious injury.



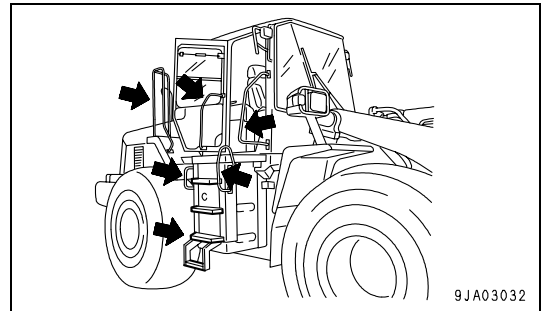
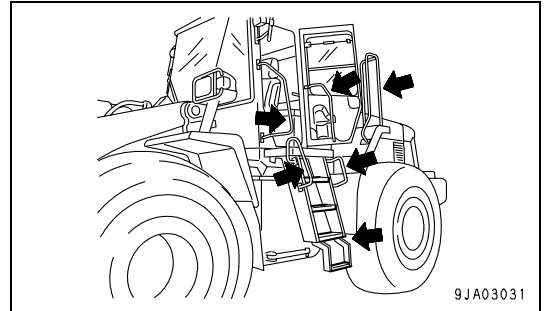
- When leaving the machine, always lower the work equipment to the ground, set safety lock lever (1) to the LOCK position and parking brake switch (2) to the ON position, then stop the engine. Lock all places and always take the key with you and leave it in the specified location.



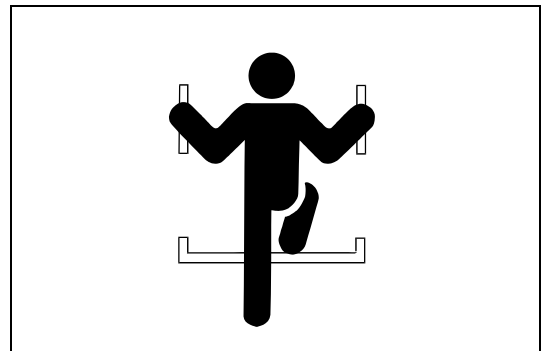
HANDRAILS AND STEPS

To prevent personal injury caused by slipping or falling off the machine, always do as follows.

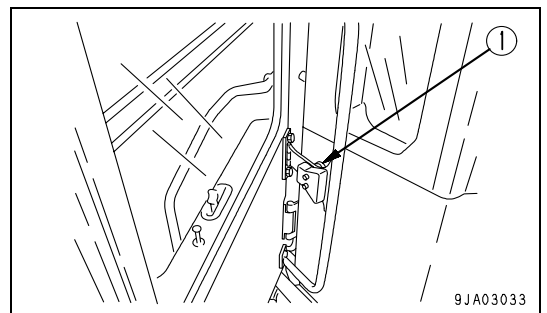
- Use the handrails and steps marked by arrows in the diagram on the right when getting on or off the machine.



- To ensure safety, always face the machine and maintain three-point contact (both feet and one hand, or both hands and one foot) with the handrails and steps to ensure that you support yourself.



- When entering the cab, open the cab door, push the door securely into catcher (1) to hold in position, then use the handrail on the inside to get on the machine. For details of the method of releasing the door lock, see "CAB DOOR OPEN LOCK (3-61)".



- Do not grip the control levers when getting on or off the machine.
- Never climb on the engine hood or covers where there are no non-slip pads.
- Never move from the step at the rear of the machine or the step at the side of the cab to stand on top of the tire.
- Before getting on or off the machine, check the handrails and steps, and if there is any oil, grease, or mud on them, wipe it off immediately. In addition, repair any damage and tighten any loose bolts.
- Do not get on or off the machine while holding tools in your hand.

MOUNTING AND DISMOUNTING

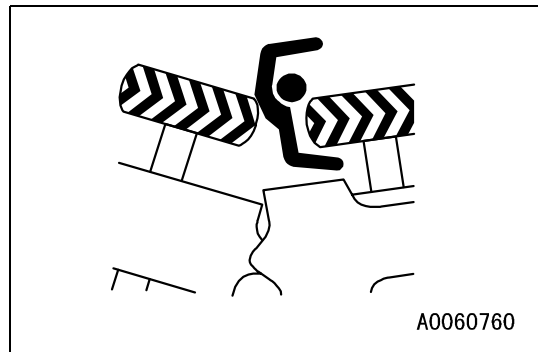
- Never jump on or off the machine. Never get on or off a moving machine.
- If the machine starts to move when there is no operator on the machine, do not jump on to the machine and try to stop it.

NO PEOPLE ON ATTACHMENTS

Never let anyone ride on the bucket, grapple, clamshell, or other attachments. There is a hazard of falling and suffering serious injury.

DO NOT GET CAUGHT IN ARTICULATED PORTION

- If the clearance at the articulating portion changes, it will lead to serious personal injury.
Do not allow anyone to come inside the articulation range.



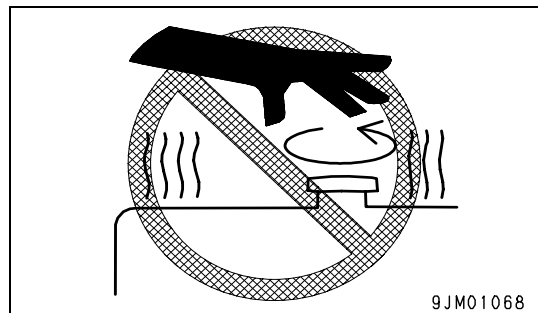
- Never enter or put your hand, arm, or any part of your body in the movable portion between the work equipment and machine or between the cylinder and the work equipment. If someone operates the control levers by mistake, the gap between the work equipment and machine and between the cylinder and work equipment will change, and you, your hand, or arm will be caught and you may suffer serious injury.
If you have to go into a movable portion, always take action to secure the work equipment and ensure that it cannot move.



PREVENTION OF BURNS

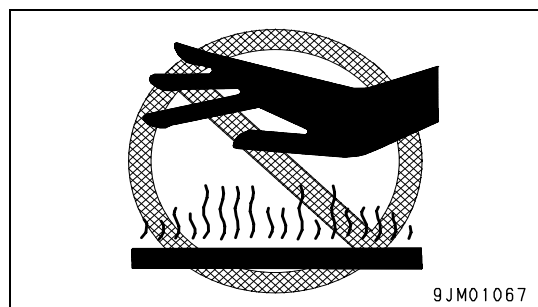
Hot coolant

- To prevent burns from hot water or steam spurting out when checking or draining the coolant, wait for the water to cool to a temperature where it is possible to touch the radiator cap by hand before starting the operation. Even when the coolant has cooled down, loosen the cap slowly to relieve the pressure inside the radiator before removing the cap.



Hot oil

- To prevent burns when checking or draining the oil, wait for the oil to cool to a temperature where it is possible to touch the plug by hand before starting the operation. Even when the oil has cooled down, loosen the plug slowly to relieve the internal pressure before removing the plug.



FIRE PREVENTION

- **Fire caused by fuel or oil**

Fuel, oil, antifreeze, and window washer liquid are particularly flammable and can be hazardous. To prevent fire, always observe the following:

- Do not smoke or use any flame near fuel or oil.
- Stop the engine before refueling.
- Do not leave the machine while adding fuel or oil.
- Tighten all fuel and oil caps securely.
- Do not spill fuel on overheated surfaces or on parts of the electrical system.
- Use well-ventilated areas for adding or storing oil and fuel.
- Keep oil and fuel in the determined place and do not allow unauthorized persons to enter.
- After adding fuel or oil, wipe up any spilled fuel or oil.
- When carrying out grinding or welding work on the chassis, move any flammable materials to a safe place before starting.
- When washing parts with oil, use a non-flammable oil. Diesel oil and gasoline may catch fire, so do not use them.
- Put greasy rags and other flammable materials into a safe container to maintain safety at the work place.
- Do not weld or use a cutting torch to cut any pipes or tubes that contain flammable liquids.



- **Fire caused by accumulation of flammable material.**

Remove any dry leaves, chips, pieces of paper, dust, or any other flammable materials accumulated or affixed around the engine, exhaust manifold, muffler, or battery, or inside the undercovers.

- **Fire coming from electric wiring**

Short circuits in the electrical system can cause fire.

- Always keep electric wiring connections clean and securely tightened.
- Check the wiring every day for looseness or damage. Tighten any loose connectors or wiring clamps. Repair or replace any damaged wiring.

- **Fire coming from hydraulic line**

Check that all the hose and tube clamps, guards, and cushions are securely fixed in position.

If they are loose, they may vibrate during operation and rub against other parts. This may lead to damage to the hoses, and cause high-pressure oil to spurt out, leading to fire damage or serious injury.

- **Explosion caused by lighting equipment**

- When checking fuel, oil, battery electrolyte, window washer fluid, or coolant, always use lighting with anti-explosion specifications. If such lighting equipment is not used, there is danger of explosion that may cause serious injury.
- When taking the electrical power for the lighting from the machine itself, follow the instructions in this manual.

ACTION IF FIRE OCCURS

If a fire occurs, escape from the machine as follows.

- Turn the start switch OFF to stop the engine.
- Use the handrails and steps to get off the machine.

WINDOW WASHER LIQUID

Use an ethyl alcohol base washer liquid. Methyl alcohol base washer liquid may irritate your eyes, so do not use it.

ROPS (Roll Over Protective Structure)

The roll-over protection system (ROPS) protects the operator and absorbs load and impact energy, if the machine should roll over.

The ROPS is a fixed component of the cab. The machine must not be operated without this roll-over protection system.

The ROPS meets the regulations of all member states of the EU. If, however, the ROPS is modified, damaged, or repaired without permission, its stability is impaired. In this case, the ROPS must be replaced, since its correct function can no longer be guaranteed.

The ROPS can only provide maximum protection, if the driver wears the safety belt correctly. For this reason, the safety belt is to be worn when the machine is in operation.

ATTACHMENT FOR PROTECTION AGAINST FALLING OBJECTS (FOPS)**NOTICE**

FOPS is a fixed component of the cab.

When you work on a site where there is danger of falling rocks or other objects, the machines must be equipped with a FOPS. If the FOPS is modified without permission or damaged, its stability is impaired. In this case, the FOPS must be replaced, since its correct function can no longer be guaranteed.

PRECAUTIONS FOR ATTACHMENTS

- When installing optional parts or attachments, there may be problems with safety or legal restrictions, Therefore contact your Komatsu distributor for advice.
- Any injuries, accidents, or product failures resulting from the use of unauthorized attachments or parts will not be the responsibility of Komatsu.
- When installing and using optional attachments, read the instruction manual for the attachment, and the general information related to attachments in this manual.

UNAUTHORIZED MODIFICATION

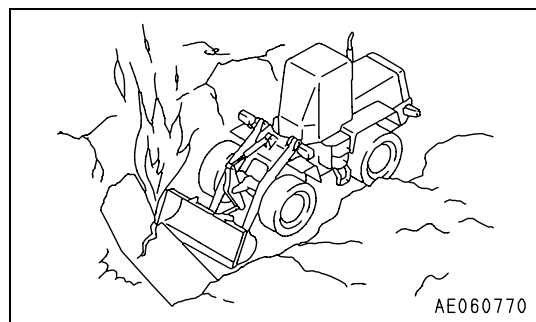
Any modification made without authorization from Komatsu can create hazards. Before making a modification, consult your Komatsu distributor.

- Komatsu will not be responsible for any injuries, accidents, or product failures resulting from modifications made without authorization from Komatsu.

SAFETY AT WORKSITE

Before starting operations, thoroughly check the area for any unusual conditions that could be dangerous.

- When carrying out operations near combustible materials such as thatched roofs, dry leaves or dry grass, there is a hazard of fire, so be careful when operating.
- Check the terrain and condition of the ground at the worksite, and determine the safest method of operation. Do not carry out operations at places where there is a hazard of landslides or falling rocks.
- If water lines, gas lines, or high-voltage electrical lines may be buried under the worksite, contact each utility and identify their locations. Be careful not to sever or damage any of these lines.
- Take action to prevent unauthorized people from approaching the jobsite.
When working on public roads, position flagmen and erect barriers to ensure the safety of passing traffic and pedestrians.
- When traveling or operating in shallow water or on soft ground, check the shape and condition of the bedrock, and the depth and speed of flow of the water before starting operations.
- Always design and maintain the roads on the jobsite so that the machines can travel safely.



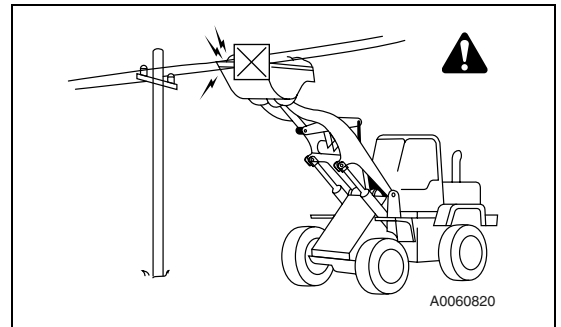
WORKING ON LOOSE GROUND

- Avoid traveling or operating your machine too close to the edge of cliffs, overhangs, and deep ditches. The ground may be weak in such areas. If the ground should collapse under the weight or vibration of the machine, there is a hazard that the machine may fall or tip over. Remember that the soil after heavy rain or blasting or after earthquakes is weak in these areas.
- When working on embankments or near excavated ditches, there is a hazard that the weight and vibration of the machine will cause the soil to collapse. Before starting operations, take steps to ensure that the ground is safe and to prevent the machine from rolling over or falling.

DO NOT GO CLOSE TO HIGH-VOLTAGE CABLES

Do not travel or operate the machine near electric cables. There is a hazard of electric shock, which may cause serious injury or property damage. On jobsites where the machine may go close to electric cables, always do as follows.

- Before starting work near electric cables, inform the local power company of the work to be performed, and ask them to take the necessary action.



- Even going close to high-voltage cables can cause electric shock, which may cause serious burns or even death. Always maintain a safe distance (see the table on the right) between the machine and the electric cable. Check with the local power company about safe operating procedure before starting operations.
- To prepare for any possible emergencies, wear rubber shoes and gloves. Lay a rubber sheet on top of the seat, and be careful not to touch the chassis with any exposed part of your body.
- Use a signalman to give warning if the machine approaches too close to the electric cables.
- When carrying out operations near high voltage cables, do not let anyone come close to the machine.
- If the machine should come too close or touch the electric cable, to prevent electric shock, the operator should not leave the operator's compartment until it has been confirmed that the electricity has been shut off. Also, do not let anyone come close to the machine.

Nominal Voltage		Safety Distance
up to 1000 V		1 m
over 1 kV	up to 110 kV	3 m
over 110 kV	up to 220 kV	4 m
over 220 kV	up to 380 kV	5 m
with unknown nominal voltage		5 m

ENSURE GOOD VISIBILITY

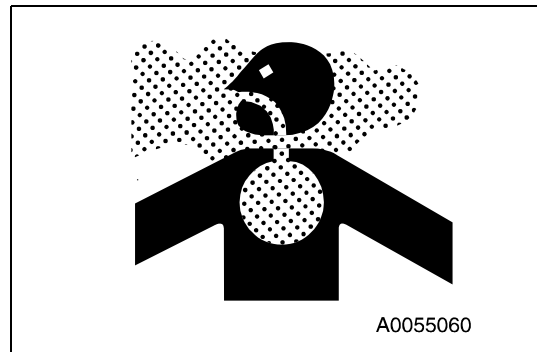
Check for any persons or obstacles in the area around the machine and check the conditions of the jobsite to ensure that operations and travel can be carried out safely. Always do as follows.

- Position a signalman if there are areas at the rear of the machine where the visibility is not good.
- When working in dark places, turn on the working lamp and front lamps installed to the machine, and set up additional lighting in the work area if necessary.
- Stop operations if the visibility is poor, such as in mist, snow, rain, or dust.

VENTILATION FOR ENCLOSED AREAS

Exhaust fumes from the engine can kill.

- If it is necessary to start the engine within an enclosed area, or when handling fuel, flushing oil, or paint, open the doors and windows to ensure that adequate ventilation is provided to prevent gas poisoning.

**CHECKING SIGNALMAN'S SIGNALS AND SIGNS**

- Set up signs to inform of road shoulders and soft ground. If the visibility is not good, position a signalman if necessary. Operators should pay careful attention to the signs and follow the instructions from the signalman.
- Only one signalman should give signals.
- Make sure that all workers understand the meaning of all signals and signs before starting work.

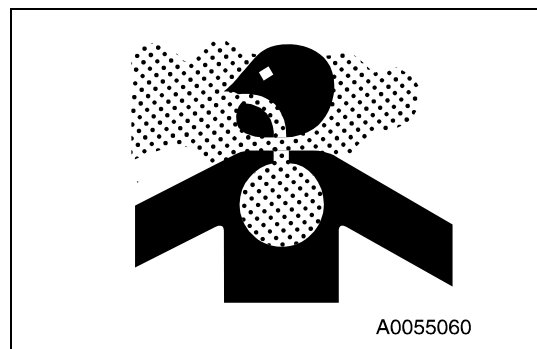
EMERGENCY EXIT FROM OPERATOR'S CAB

Machines equipped with a cab have doors on the left and right sides. If the door on the one side does not open, escape from the door on the other side.

BE CAREFUL ABOUT EXHAUST DUST

Asbestos dust in the air can cause lung cancer if it is inhaled. There is danger of inhaling asbestos when working on jobsites handling demolition work or work handling industrial waste. Always observe the following.

- Spray water to keep down the dust when cleaning.
- Do not use compressed air for cleaning.
- If there is danger that there may be asbestos dust in the air, always operate the machine from an upwind position.
- All workers should use an approved respirator.
- Do not allow other persons to approach during the operation.



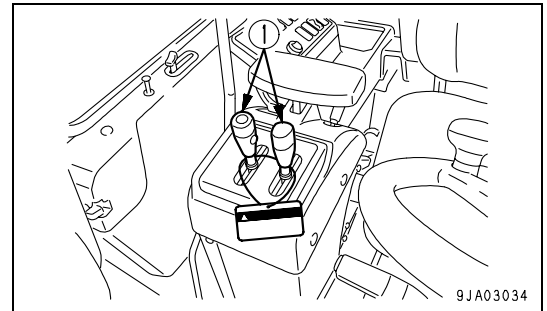
- Always observe the rules and regulations for the work site and environmental standards.

This machine does not use asbestos, but there is a danger that imitation parts may contain asbestos, so always use genuine Komatsu parts.

PRECAUTIONS FOR OPERATION

BEFORE STARTING ENGINE

If there is a warning tag hanging from the work equipment control lever, do not start the engine or touch the levers (1).



CHECKS BEFORE STARTING ENGINE

Carry out the following checks before starting the engine at the beginning of the day's work.

- Remove all dirt from the surface of the window glass to ensure a good view.
- Remove all dirt from the surface of the lens of the front lamps, working lamps, and rear combination lamp, and check that they light up correctly.
- Check the coolant level, fuel level, and oil level in engine oil pan, check for clogging of the air cleaner, and check for damage to the electric wiring.
- Check that there is no mud or dust accumulated around the movable parts of the accelerator pedal or brake pedal, and check that the pedals work properly.
- Adjust the operator's seat to a position where it is easy to carry out operations, and check that there is no damage or wear to the seat belt or mounting clamps.
- Check that the gauges work properly, check the angle of the lights and working lamps, and check that the control levers are all at the neutral position.
- Before starting the engine, make sure that the safety lock lever is in the LOCK position.
- Adjust the mirrors so that the rear of the machine can be seen clearly from the operator's seat. See "ADJUST REAR VIEW MIRROR (3-78)".
- Check that there are no persons or obstacles above, below, or in the area around the machine.

PRECAUTIONS WHEN STARTING

- Only start and operate the machine from the seat. Never try to start the engine by hot-wiring the ignition. This can cause fire, grave injuries or death.
- When starting the engine, sound the horn as a warning.
- Do not allow anyone apart from the operator to ride on the machine.
- Do not short circuit the starting motor circuit to start the engine. It is not only dangerous, but will also cause damage to the equipment.
- For machines equipped with a back-up alarm, check that the alarm works properly.

PRECAUTIONS IN COLD AREAS

- Carry out the warming-up operation thoroughly. If the machine is not thoroughly warmed up before the control levers are operated, the reaction of the machine will be slow, and this may lead to unexpected accidents.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a hazard that this will ignite the battery.

Before charging or starting the engine with a different power source, melt the battery electrolyte and check for frost and leakage of battery electrolyte before starting.

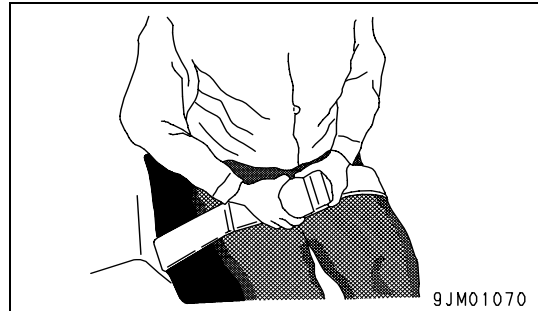
OPERATION

CHECKS BEFORE STARTING ENGINE

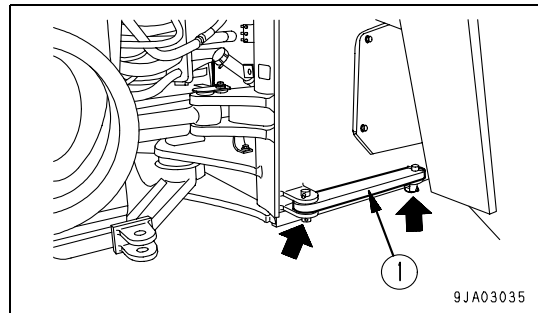
When carrying out the checks, move the machine to a wide area where there are no obstructions, and operate slowly. Do not allow anyone near the machine.

- Always fasten your seat belt.
- Check for any abnormality in the sound of the machine, vibration, heat, smell, or gauges; check also that there is no leakage of oil or fuel.
- Check for any abnormality in the sound of the machine, vibration, heat, smell, or gauges; check also that there is no leakage of oil or fuel.
- If any abnormality is found, carry out repairs immediately.

- Before driving the machine or starting operations, check that safety bar (1) is securely fixed at the FREE position.



9JM01070

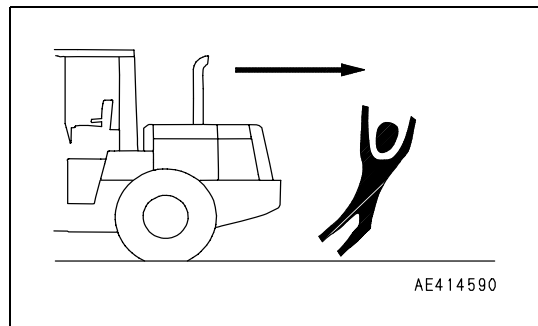


9JA03035

PRECAUTIONS WHEN TRAVELING IN FORWARD OR REVERSE

- Before travelling, check again that there is no one in the surrounding area, and that there are no obstacles.
 - Before travelling, sound the horn to warn people in the area.
 - Always operate the machine only when seated.
 - Do not allow anyone apart from the operator to ride on the machine.
 - Check that the back-up alarm (alarm buzzer when machine travels in reverse) works properly.
 - Always lock the door and windows of the operator's compartment in position (open or closed).
- On jobsites where there is a hazard of flying objects or of objects entering the operator's compartment, check that the door and windows are securely closed.
- If there is an area to the rear of the machine which cannot be seen, position a signal person. Take special care not to hit other machines or people when turning or swinging the machine.

Always be sure to carry out the above precautions even when the machine is equipped with mirrors.

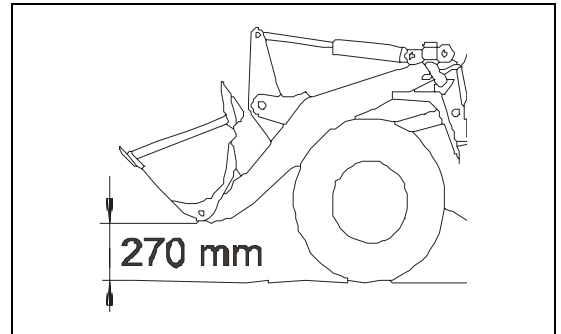


AE414590

PRECAUTIONS WHEN TRAVELING

- Never turn the key in the starting switch to the OFF position. It is dangerous if the engine stops when the machine is traveling, because the steering becomes heavy. If the engine stops, depress the brake pedal immediately to stop the machine.
- When traveling on level ground, keep the work equipment at height of 27 cm from the ground.
When traveling, do not operate the work equipment control levers. If the work equipment control levers have to be operated, stop the machine first, then operate the levers.
- When traveling on rough ground, travel at low speed and do not operate the steering suddenly. There is danger that the machine may turn over. The work equipment may hit the ground surface and cause the machine to lose its balance, or may damage the machine or structures in the area.
- Avoid traveling over obstacles when possible. If the machine has to travel over an obstacle, keep the work equipment close to the ground and travel at low speed. Never travel over obstacles which make the machine tilt strongly to one side.
- When traveling or carrying out operations, always keep a safe distance from people, structures, or other machines to avoid coming into contact with them.
- When passing over bridges or structures, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- When operating in tunnels, under bridges, under electric wires, or other places where the height is limited, operate slowly and be extremely careful not to let the work equipment hit anything.
- Always obey the traffic regulations when traveling on public roads. This machine travels at a lower speed than normal automobiles, so keep to the side of the road and be careful to leave the center of the road free for other vehicles.
- If you drive the machine at high speed continuously for a long time, the tires will overheat and the internal pressure will become abnormally high. This may cause the tires to burst. If a tire bursts, it produces an extremely large destructive force, and this may cause serious injury or accident.

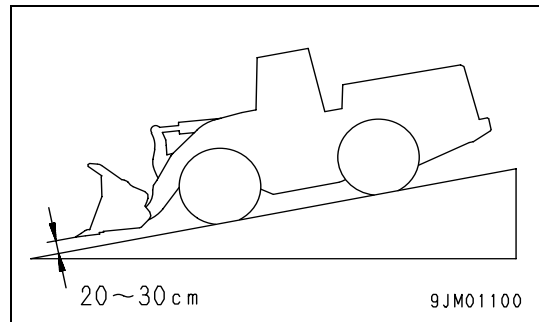
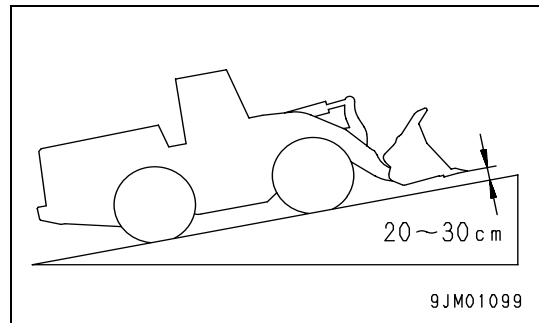
If you are going to travel continuously, please consult your Komatsu distributor.



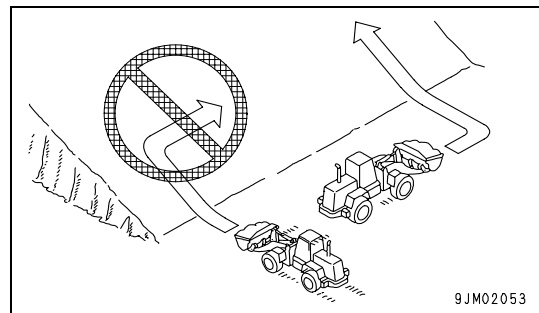
TRAVELING ON SLOPES

To prevent the machine from tipping over or slipping to the side, always do as follows.

- Keep the work equipment approx. 20 to 30 cm (8 to 12 in) above the ground. In case of emergency, lower the work equipment to the ground immediately to help stop the machine.



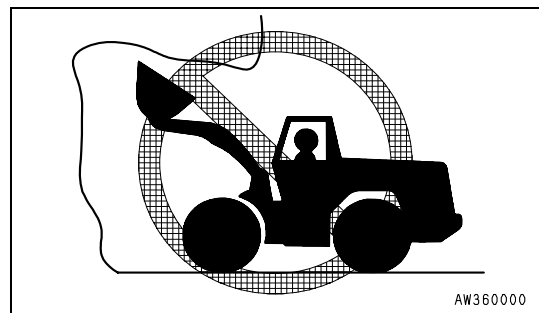
- Always travel straight up or down a slope. Traveling at an angle or across the slope is extremely dangerous.
- Do not turn on slopes or travel across slopes. Always go down to a flat place to change the position of the machine, then travel on to the slope again.



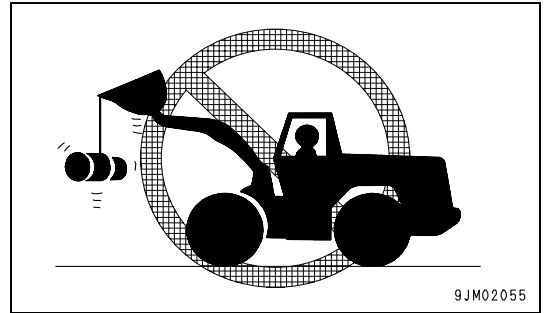
- Travel on grass, fallen leaves, or wet steel plates with low speed. Even with slight slopes there is a hazard that the machine may slip.
- If the engine stops, depress the brake pedal immediately, lower the bucket to the ground, and apply the parking brake to stop the machine.
- When traveling downhill, never shift gear or place the transmission at neutral. It is dangerous not to use the braking force of the engine. Always place the transmission in a low gear before starting to travel downhill.
- When traveling downhill, travel slowly. If necessary, use the braking force of the engine together with the brake pedal to control the travel speed.
- When traveling up or down hills with a loaded bucket, always travel with the bucket facing uphill. If the machine travels with the bucket facing downhill, there is danger that the machine may tip over.

PROHIBITED OPERATIONS

- It is dangerous to excavate the bottom of a rock face. Never do this.



- It is dangerous to use the bucket or lift arm for crane operations, so do not carry out such operations.
- Do not pass the bucket over the head of other workers or over the operator's seat of dump trucks or other hauling equipment. The load may spill or the bucket may hit the dump truck and cause serious injury or property damage.

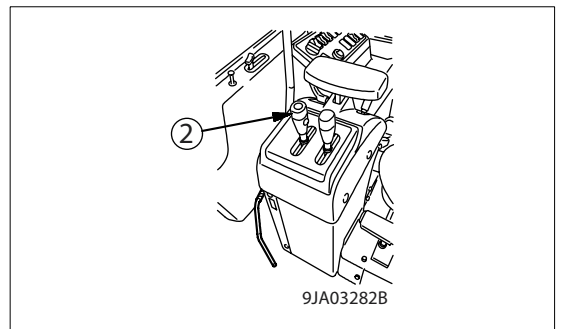


EMERGENCY LOWERING SYSTEM

When the engine is not running, you can lower the work unit by means of the pilot control lever.

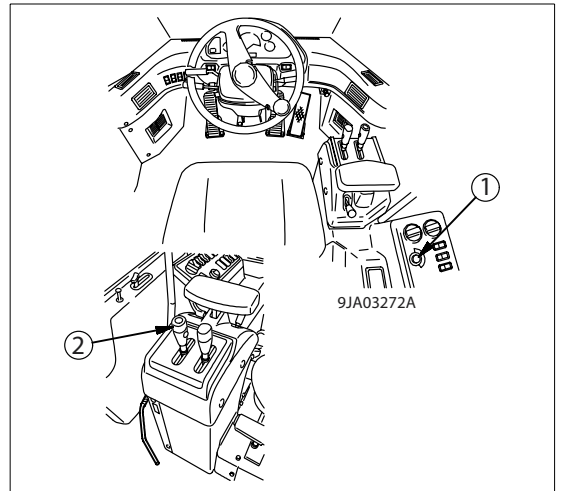
- PPC control lever

To achieve this, slowly press the pilot control lever (2) forward to the "LOWER" position.



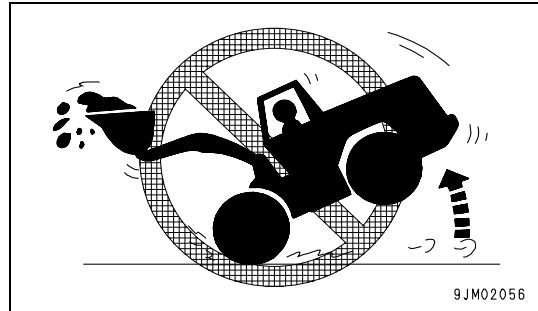
- EPC control lever

1. Turn the key in ignition switch (1) to ON.
2. Then slowly press the pilot control lever (2) forward to the "LOWER" position.



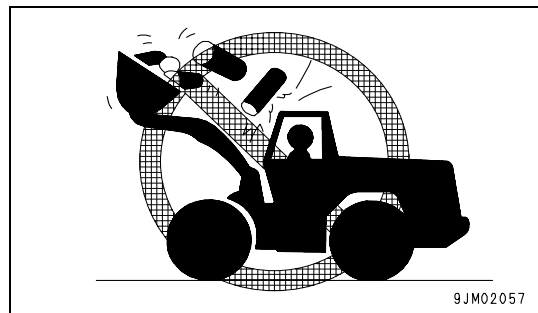
PRECAUTIONS WHEN OPERATING

- When using the machine, to prevent the machine from overturning due to overloading and to avoid damage to the work equipment, do not exceed the maximum permitted load or performance of the machine.
- If the engine cannot be started again after it has stopped, immediately operate the work equipment control levers to lower the work equipment to the ground. (After the engine stops, the accumulator allows the work equipment to be operated for a limited time.)
- Be careful not to approach too close to the edge of cliffs. When making embankments or landfills, or when dropping soil over a cliff, dump one pile, then use the next pile of soil to push the first pile.
- The load suddenly becomes lighter when the soil is pushed over a cliff or when the machine reaches the top of a slope. When this happens, there is danger that the travel speed will suddenly increase, so be sure to reduce the speed.
- When the bucket is fully loaded, never start, turn, or stop the machine suddenly. There is danger of the machine turning over.



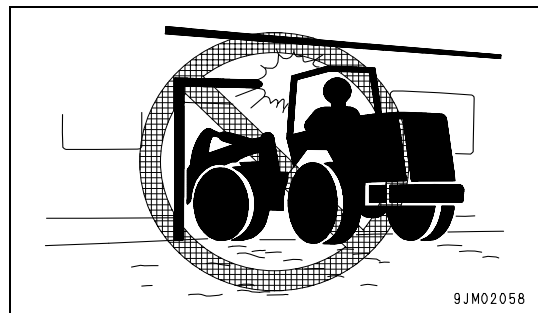
9JM02056

- When handling unstable loads, such as round or cylindrical objects, or piled sheets, if the work equipment is raised high, there is danger that the load may fall on top of the operator' compartment and cause serious injury or damage.
- When handling unstable loads, be careful not to raise the work equipment too high or tip the bucket back too much.
- If the work equipment is suddenly lowered or suddenly stopped, the reaction may cause the machine to tip over. Particularly when carrying a load, be sure to operate the work equipment carefully.



9JM02057

- When operating in tunnels, under bridges, under electric wires, or other places where the height is limited, be extremely careful not to let the work equipment hit anything.
- To prevent accidents caused by hitting other objects, always operate the machine at a speed which is safe for operation, particular in confined spaces, indoors, and in places where there are other machines.



9JM02058

METHODS OF USING BRAKE

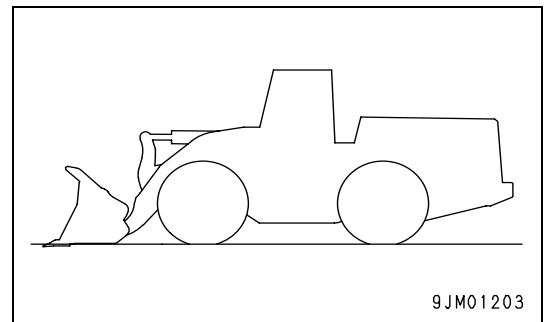
- When the machine is traveling, do not rest your foot on the brake pedal. If you travel with your foot resting on the pedal, the brake will always be applied, and this will cause the brakes to overheat and fail.
- Do not depress the brake pedal repeatedly if not necessary.
- When traveling downhill, use the braking force of the engine, and always use the right brake pedal at the same time.

OPERATE CAREFULLY ON SNOW

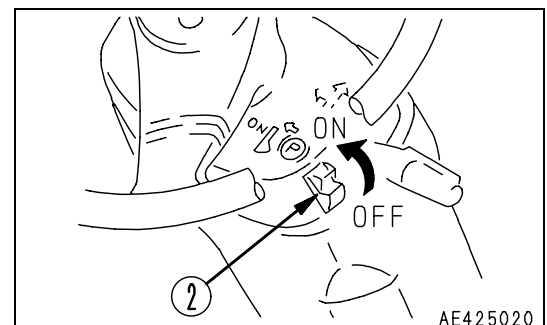
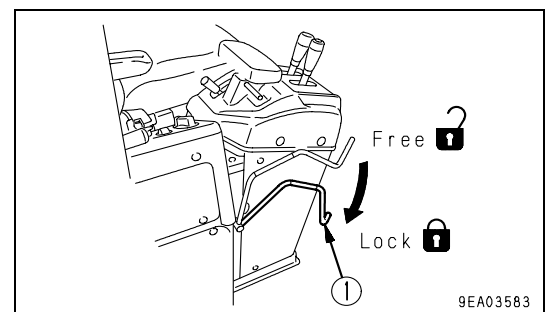
- Snow-covered or frozen surfaces are slippery, so be extremely careful when traveling or operating the machine, and do not operate the levers suddenly. Even a slight slope may cause the machine to slip, so be particularly careful when working on slopes.
- With frozen ground surfaces, the ground becomes soft when the temperature rises, and this may cause the machine to tip over.
- If the machine enters deep snow, there is a hazard that it may tip over or become buried in the snow. Be careful not to leave the road shoulder or to get trapped in a snow drift.
- When clearing snow, the road shoulder and objects placed beside the road are buried in the snow and cannot be seen. There is a hazard of the machine tipping over or hitting covered objects, so always carry out operations carefully.
- When traveling on snow-covered roads, always fit tire chains.
- When traveling on snow-covered slopes, never apply the brakes suddenly. Reduce the speed and use the engine as a brake while applying the foot brake intermittently (depress the brake intermittently several times). If necessary, lower the bucket to the ground to stop the machine.

PARKING MACHINE

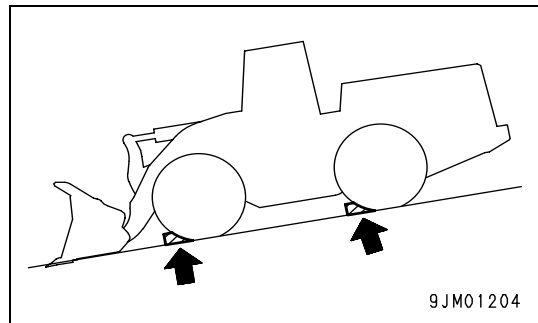
- Park the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground.



- When leaving the machine, set safety lock lever (1) to the LOCK position and parking brake switch (2) to the ON position, and stop the engine.
- Always close the operator's cab door, and use the key to lock all the equipment in order to prevent any unauthorized person from moving the machine. Always remove the key, take it with you, and leave it in the specified place.



- If it is necessary to park the machine on a slope, set blocks under the wheels to prevent the machine from moving.



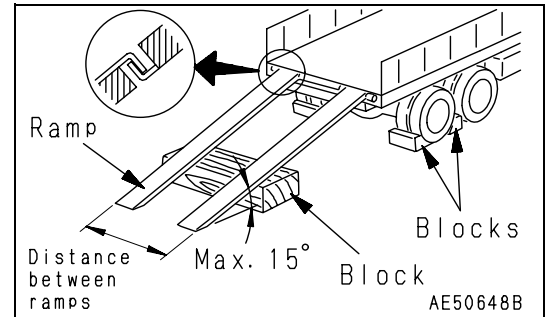
TRANSPORTATION

The machine can be divided into parts for transportation, so when transporting the machine, please contact your Komatsu distributor to have the work carried out.

LOADING AND UNLOADING

When loading or unloading the machine, mistaken operation may bring the hazard of the machine tipping over or falling, so particular care is necessary. Always do as follows.

- Perform loading and unloading on firm, level ground only. Maintain a safe distance from the edge of the road or cliff.
- Always use ramps of adequate strength. Be sure that the ramps are wide, long, and thick enough to provide a safe loading slope. Take suitable steps to prevent the ramps from moving out of position or coming off.
- Be sure the ramp surface is clean and free of grease, oil, ice and loose materials. Remove dirt from machine-tracks. On a rainy day, in particular, take extremely careful since the ramp surface is slippery.
- Run the engine at low idling and operate slowly at low speed.
- Never correct your steering on the ramps. If necessary, drive off the ramps, correct the direction, then enter the ramps again.
- When loading or unloading to an embankment or platform, make sure that it has suitable width, strength, and grade.
- For machines equipped with a cab, always lock the door after boarding the machine. If this is not done, the door may suddenly open during transportation. Refer to "TRANSPORTATION (3-117)".



SHIPPING

When shipping the machine on a trailer, do as follows.

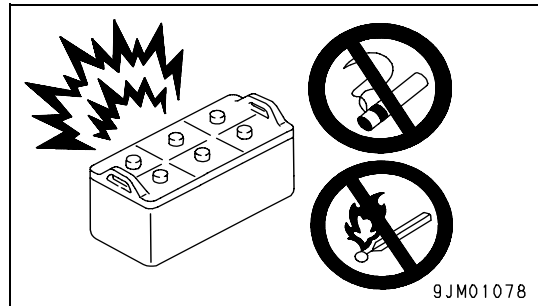
- The weight, transportation height, and overall length of the machine differ according to the work equipment, so be sure to confirm the dimensions.
- When passing over bridges or structures on private land, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- Lock the frame with the safety bar to prevent the machine from articulating.
- For details of the shipping procedure, see "TRANSPORTATION (3-117)" in the OPERATION section.

BATTERY

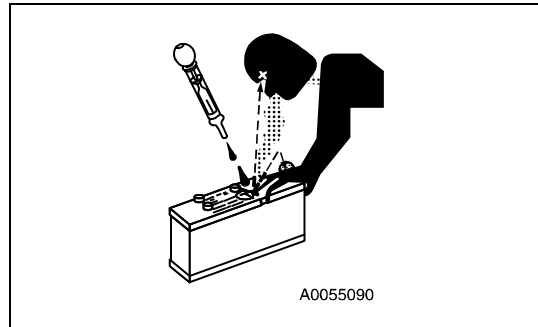
BATTERY HAZARD PREVENTION

Battery electrolyte contains sulphuric acid, and batteries generate flammable hydrogen gas, which may explode. Mistaken handling can lead to serious injury or fire. For this reason, always observe the following precautions.

- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Always check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.
- When working with batteries, always wear safety glasses and rubber gloves.
- Never smoke or use any flame near the battery.



- If you spill acid on your clothes or skin, immediately flush the area with large amount of water.
- If acid gets into your eyes, flush them immediately with large amount of water and seek medical attention.



- Before working with batteries, turn the starting switch to the OFF position.

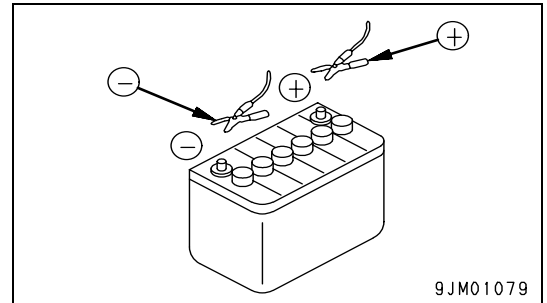
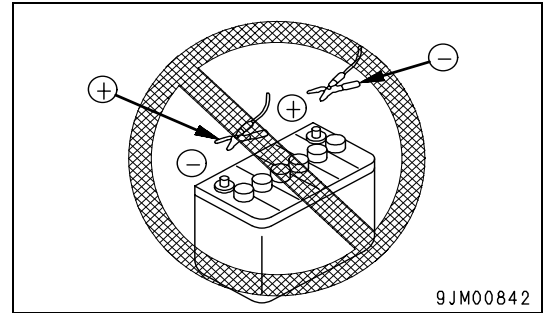
As there is a hazard that sparks will be generated, always do as follows.

- Do not let tools or other metal objects make any contact between the battery terminals. Do not leave tools or other metal objects lying around near the battery.
- Always disconnect the negative (-) terminal (ground side) first when removing the battery; when installing the battery, connect the positive (+) terminal first, and connect the ground last.
- Attach the battery terminal securely.
- Flammable hydrogen gas is generated when the battery is charged, so remove the battery from the chassis, take it to a well-ventilated place, and remove the battery caps before charging it.
- Tighten the battery caps securely.
- Install the battery securely to the determined place.

STARTING WITH BOOSTER CABLES

If any mistake is made in the method of connecting the booster cables, it may cause the battery to explode, so always do as follows.

- When starting with a booster cable, carry out the starting operation with two workers (one worker sitting in the operator's seat and the other working with the battery).
- When starting from another machine, do not allow the two machines to touch.
- When connecting the booster cables, turn the starting switch OFF for both the normal machine and problem machine. There is a hazard that the machine will move when the power is connected.
- Be sure to connect the positive (+) cable first when installing the booster cables. Disconnect the negative (-) cable (ground side) first when removing them.
- When removing the booster cables, be careful not to let the booster cable clips touch each other or to let the clips touch the machine.
- Always wear safety goggles and rubber gloves when starting the engine with booster cables.
- When connecting a normal machine to a problem machine with booster cables, always use a normal machine with the same battery voltage as the problem machine.
- For details of the starting procedure when using booster cables, see "STARING ENGINE WITH BOOSTER CABLE (3-132)" in the OPERATION section.



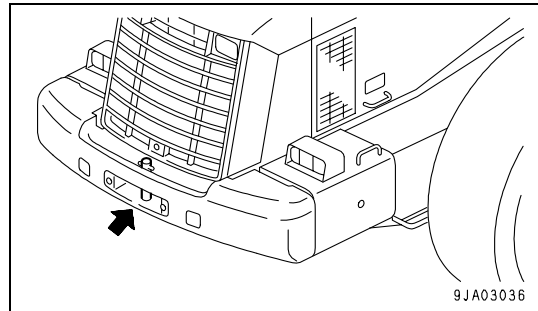
TOWING

WHEN TOWING

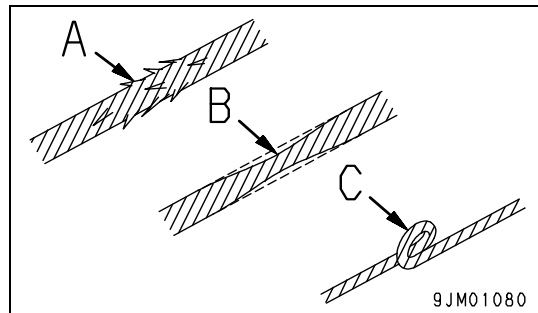
Serious injury or death could result if a disabled machine is towed incorrectly or if there is a mistake in the selection or inspection of the wire rope.

For towing, see "TOWING THE MACHINE (3-127)".

- Always wear leather gloves when handling wire rope.
- During the towing operation, never stand between the towing machine and the machine being towed.
- Never tow a machine on a slope.



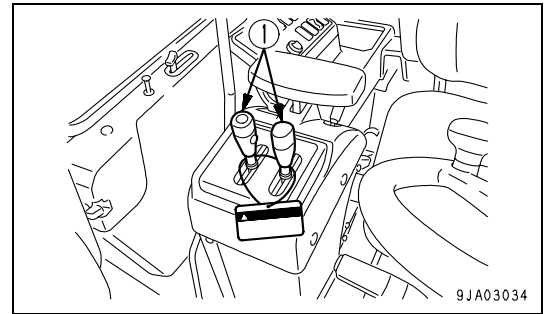
- Never use a wire rope which has cut strands (A), reduced diameter (B), or kinks ©. There is danger that the rope may break during the towing operation.



PRECAUTIONS FOR MAINTENANCE

WARNING TAG

- Always attach the “DO NOT OPERATE” warning tag to work equipment control lever (1) in the operator’s cab to alert others that you are performing service of maintenance on the machine. Attach additional warning tags around the machine if necessary.



- Keep this warning tag in the tool box while it is not used. If there is not the tool box, keep the tag in the operation manual pocket.



- If others start the engine, or touch or operate the work equipment control lever while you are performing service or maintenance, you could suffer serious injury or property damage.

KEEP WORK PLACE CLEAN AND TIDY

Do not leave hammers or other tools lying around in the work place. Wipe up all grease, oil, or other substances that will cause you to slip. Always keep the work place clean and tidy to enable you to carry out operations safely. If the work place is not kept clean and tidy, there is the danger that you will trip, slip, or fall over and injure yourself.

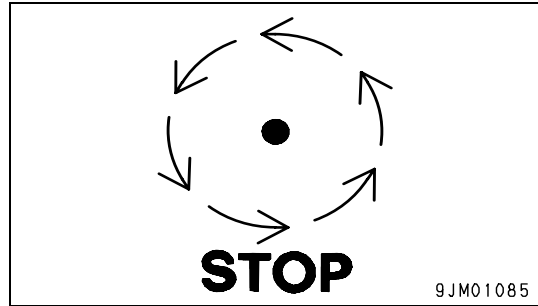
APPOINT LEADER WHEN WORKING WITH OTHERS

When repairing the machine or when removing and installing the work equipment, appoint a leader and follow his instructions during the operation.

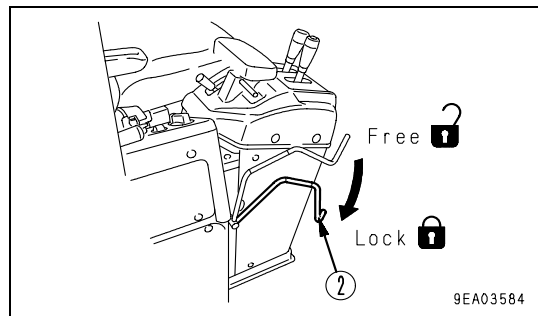
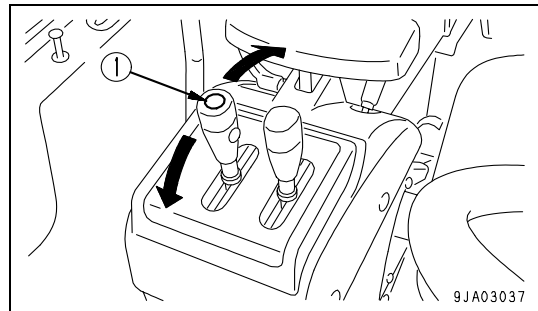
When working with others, misunderstandings between workers can lead to serious accidents.

MAINTENANCE WITH ENGINE RUNNING

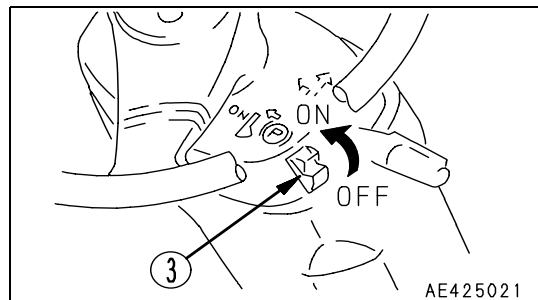
- Stop the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground and stop the engine.



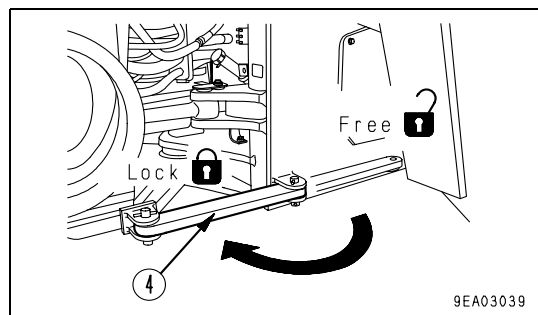
- After stopping the engine, operate work equipment control lever (1) 2 to 3 times fully to the RAISE and LOWER positions to release the pressure inside the hydraulic circuit, then set safety lock lever (2) to the LOCK position.



- Turn parking brake switch (3) to the ON position and apply the parking brake, then put blocks under the front and rear of the tires.



- Lock the front and rear frames with safety bar (4).

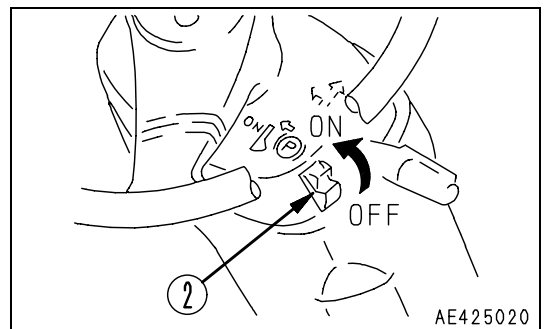
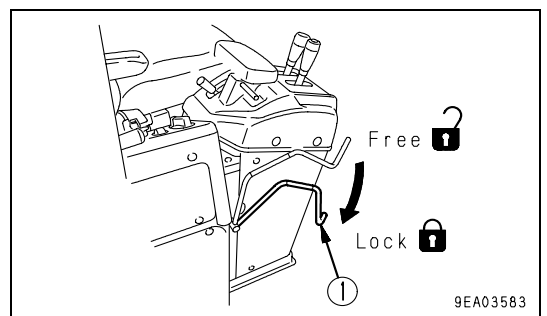
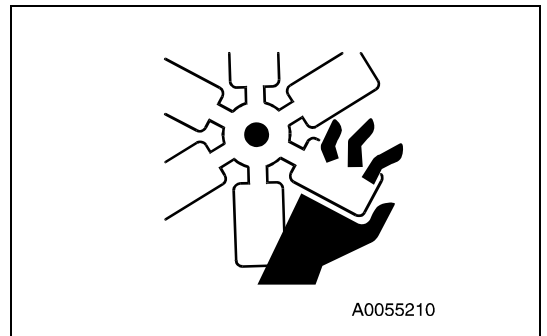


TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING

To prevent injury, do not carry out maintenance with the engine running. If maintenance must be carried out with the engine running, carry out the operation with at least two workers and do as follows.

- One worker must always sit in the operator's seat and be ready to stop the engine at any time. All workers must maintain contact with the other workers.
- Never drop or insert tools or other objects into the fan or fan belt. Parts may break or be sent flying.
- When carrying out operations near the fan, fan belt, or other rotating parts, there is a hazard of being caught in the parts, so be extremely careful.

- Set safety lock lever (1) to the LOCK position to prevent the work equipment from moving.
Turn parking brake switch (2) to the ON position and apply the parking brake.
- Do not touch any control levers. If any control lever must be operated, give a signal to the other workers to warn them to move to a safe place.

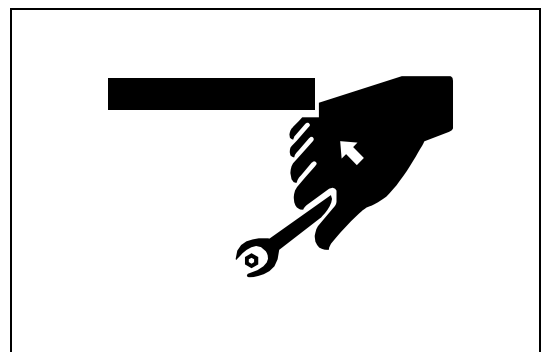


INSPECTION AND MAINTENANCE AFTER TURNING E.C.S.S. SWITCH OFF

For machines equipped with a E.C.S.S, lower the bucket to the ground, turn the E.C.S.S, switch OFF, and stop the engine before starting inspection or maintenance. NEVER turn the switch ON during inspection or maintenance.

PROPER TOOLS

Use only tools suited to the task and be sure to use the tools correctly. Using damaged, low quality, faulty, makeshift tools or improper use of the tools could cause serious personal injury.



ACCUMULATOR

The accumulator is charged with high-pressure nitrogen gas. When handling the accumulator, careless procedure may cause an explosion which could lead to serious injury or property damage. For this reason, always observe the following precautions.

- Do not disassemble the accumulator.
- Do not bring it near flame or dispose of it in fire.
- Do not make holes in it, weld it, or use a cutting torch.
- Do not hit or roll the accumulator, or subject it to any impact.
- When disposing of the accumulator, the gas must be released. Please contact your Komatsu distributor to have this work performed.



PERSONNEL

Only authorized personnel can service and repair the machine. Do not allow unauthorized personnel into the area. If necessary, employ an observer.

ATTACHMENTS

- Appoint a leader before starting removal or installation operations for attachments.
- Place attachments that have been removed from the machine in a stable condition so that they do not fall. And take steps to prevent unauthorized persons from entering the storage area.

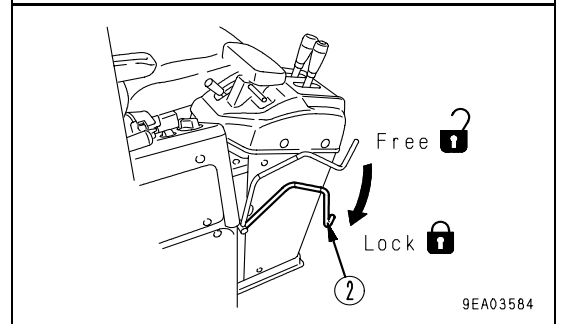
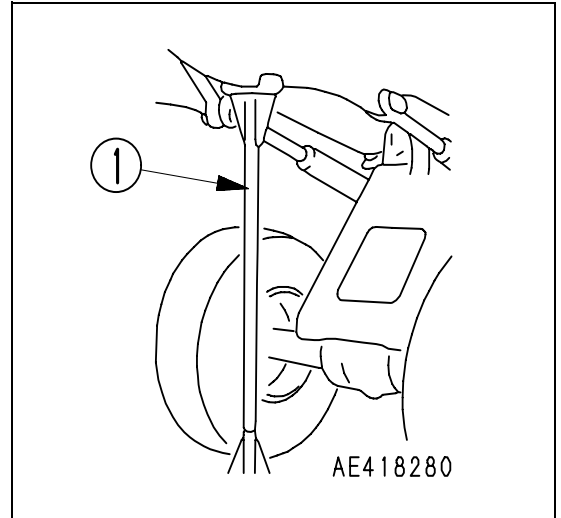


WORKING UNDER THE RAISED BOOM

⚠ WARNING

Danger of injury! The raised boom may suddenly fall! For safety reasons, a raised boom must be secured against dropping before you pass or stand under it.

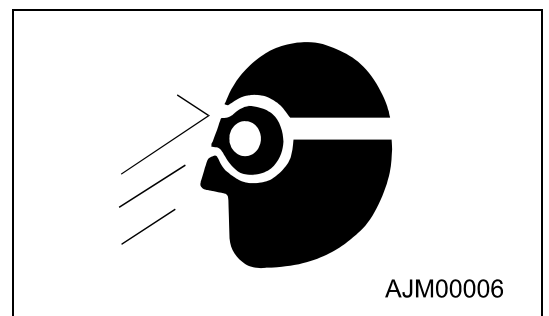
- The boom must be secured against moving if any work is to be carried out under it when it is in a raised position. For this purpose you should use a supporting prop (1) which is to be positioned below the boom.
- Park the machine on level, solid ground.
- Apply the parking brake.
- Place wheel chocks in front of the wheels to prevent the machine from inadvertently rolling away.
- Lift the arm far enough to allow the supporting prop to be placed beneath the boom.
- Switch off the engine.
- With the engine switched off, lower the boom slowly until it rests on the supporting prop.
- Set the control lever to "NEUTRAL" and secure it with the safety lever (2) (locked).



PRECAUTIONS WHEN USING HAMMER

When using a hammer, pins may fly out or metal particles may be scattered. This may lead to serious injury. Always do as follows.

- If hard metal parts such as pins, bucket teeth, cutting edges, or bearings are hit with a hammer, there is a hazard that pieces might be scattered and cause injury. Always wear safety goggles and gloves.
- When hitting pins or bucket teeth, there is a hazard that broken pieces might be sent flying and injure people in the surrounding area. Always check that there is no one in the surrounding area.
- If pins are hit with strong force, there is a hazard that the pin may fly out and injure people in the surrounding area.



REPAIR WELDING

Welding operations must always be carried out by a qualified welder and in a place equipped with a proper equipment. There is a hazard of fire or electrocution when carrying out welding, so never allow any unqualified personnel to carry out welding.

REMOVING BATTERY TERMINAL

When repairing the electrical system or when carrying out electrical welding, remove the negative (-) terminal of the battery to prevent the flow of current.

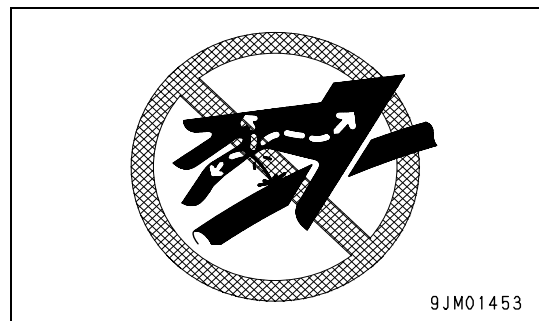
PRECAUTIONS WITH HIGH-PRESSURE OIL

The hydraulic system is always under internal pressure. When inspecting or replacing piping or hoses, always check that the pressure in the hydraulic circuit has been released. If the circuit is still under pressure, it will lead to serious injury or property damage, so always do as follows.

- When carrying out inspection and maintenance of the pressure, release the pressure before starting. For details, see "MAINTENANCE WITH ENGINE RUNNING (2-26)". Do not carry out inspection or replacement work with the circuit under pressure.
- If there is any leakage from the piping or hoses, the surrounding area will be wet, so check for cracks in the piping and hoses and for swelling in the hoses.

When carry out inspection, wear safety glasses and leather gloves.

- There is a hazard that high-pressure oil leaking from small holes may penetrate your skin or cause blindness if it contacts your eyes directly. If you are hit by a jet of high-pressure oil and suffer injury to your skin or eyes, wash the place with clean water, and consult a doctor immediately for medical attention.
- The pressure in the E.C.S.S. circuit is stored by an accumulator. Do not remove the E.C.S.S. piping or components. If it is necessary to remove them, please ask your Komatsu distributor to carry out the removal operation.



PRECAUTIONS FOR HIGH-PRESSURE FUEL

High pressure is generated inside the engine fuel piping when the engine is running. When carrying out inspection or maintenance of the fuel piping system, wait for at least 30 seconds after stopping the engine to let the internal pressure go down before starting inspection or maintenance.

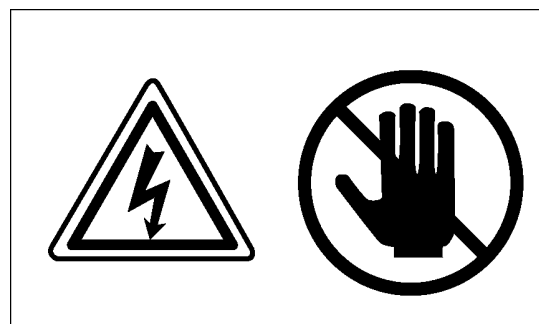
HANDLING HIGH-PRESSURE HOSES

- If oil or fuel leaks from high-pressure hoses, it may cause fire or defective operation, which may lead to serious injury or property damage. If any loose bolts are found, stop work and tighten to the specified torque.
- If any damaged hoses are found, stop operations immediately and contact your Komatsu distributor.
- Replace all hoses every six years at the latest. The shelf life of the hose should not exceed 2 years.
- Replace the hose if any of the following problems are found:
 - Damaged or leaking hydraulic fitting.
 - Frayed or cut covering or exposed reinforcement layer of wire.
 - Covering swollen in places.
 - Twisted or crushed movable portion.
 - Foreign material embedded in covering.
 - When replacing the hoses, always replace the O-rings, gaskets, and other such parts at the same time.
- For details, see "PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS (4-14)".

PRECAUTIONS FOR HIGH VOLTAGE

- When the engine is running and immediately after it is stopped, high voltage is generated inside the engine controller and the engine injector, and there is danger of electrocution. Never touch the inside of the controller or the engine injector portion.

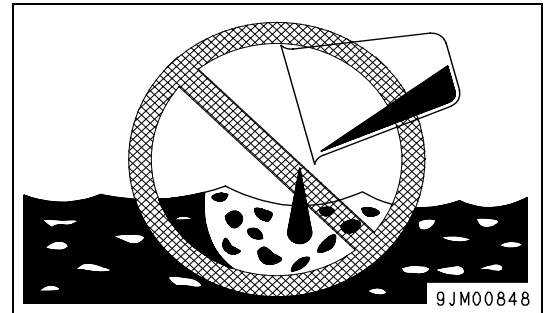
If it is necessary to touch the inside of the controller or the engine injector portion, please contact your Komatsu distributor.



WASTE MATERIALS

To prevent pollution, pay careful attention to the method of disposing of waste materials.

- Always put oil drained from your machine in containers. Never drain oil directly onto the ground or dump into the sewage system, rivers, the sea, or lakes.
- Obey appropriate laws and regulations when disposing of harmful objects such as oil, fuel, coolant, solvent, filters, and batteries.

**MAINTENANCE OF AIR CONDITIONER**

If air conditioner refrigerant gets into your eyes, it may cause blindness; if it touches your skin, it may cause frost-bite. Never touch refrigerant.

COMPRESSED AIR

- When carrying out cleaning with compressed air, there is a hazard of serious injury or property damage caused by flying particles.
- When using compressed air to clean elements or the radiator, always wear safety goggles, dust mask, gloves, and other protective equipment.

PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

- In order for the machine to be operated safely for a long time, it is necessary to add oil and to carry out service and maintenance at periodic intervals. In order to further increase safety, components with a strong relationship to safety, such as hoses and seat belts, must be replaced at periodic intervals.
Replacement of safety critical parts: See "PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS (4-14)".
- The material of these components naturally changes over time, and repeated use causes deterioration, wear, and fatigue. As a result, there is a hazard that these components may fail and cause serious injury or property damage. It is difficult to judge the remaining life of these components from external inspection or the feeling when operating, so always replace them at the specified interval.
- Replace or repair safety critical parts if any defect is found, even when they have not reached the time specified interval.

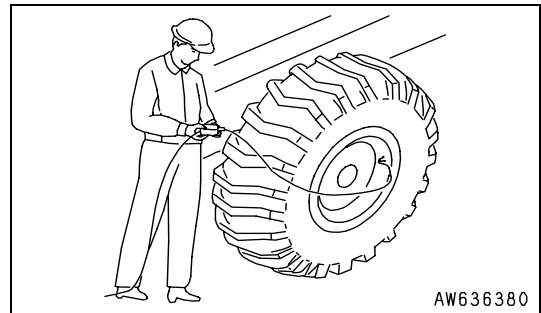
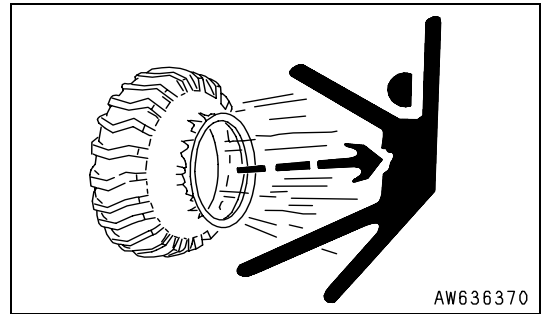
PRECAUTIONS WITH TIRES

HANDLING TIRES

If tires or rims are handled mistakenly, there is danger that the tire may explode or be damaged, or that the rim may fly off and cause serious injury or death.

To maintain safety, always do as follows.

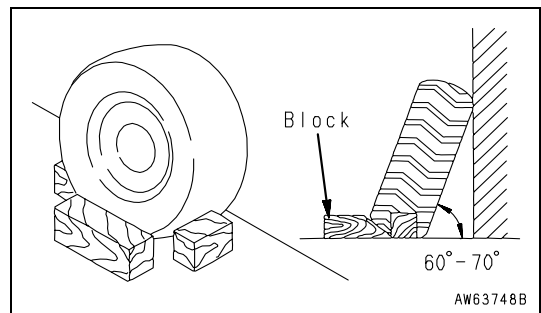
- Maintenance, disassembly, repair, and assembly of the tires and rims requires special equipment and special technology, so always ask your Komatsu distributor to carry out these operations.
- Always use the tires specified by Komatsu and maintain the specified inflation pressure.
Suitable tire inflation pressure: see "HANDLING THE TIRES (3-115)"
- When pumping up the tires, check that no other person is standing near the tire, and install an air chuck with a clip that can be secured to the air valve.
To prevent the tire inflation pressure from becoming too high, measure the pressure from time to time with an air gauge while pumping up the tire.
- If the tire pressure goes down abnormally or the rim parts do not fit the tire, there is a problem with the tire or rim parts. Always contact your Komatsu distributor for repairs.
- If the rim parts are not fitted properly when the tire is being pumped up, there is danger that the rim parts may fly off, so set up a protective fence around the tire, and do not stand directly in front of the rim. Stand beside the tread when pumping up the tire.
- Do not adjust the tire inflation pressure immediately after traveling at high speed or carrying out operations under heavy load.
- Never carry out welding or light a fire near the tire.



PRECAUTIONS WHEN STORING TIRE

Tires for construction equipment are extremely heavy, so they may cause serious personal injury.

- As a basic rule, store the tires in a warehouse which unauthorized persons cannot enter.
If the tires must be stored outside, always erect a fence and put up "No Entry" signs.
- Stand the tire on level ground, and block it securely so that it cannot roll or fall over if any person should touch it.
Do not lay the tire on its side. This will deform the tire and cause it to deteriorate.
- If the tire should fall over, do not attempt to stop it. Get out of the way quickly.



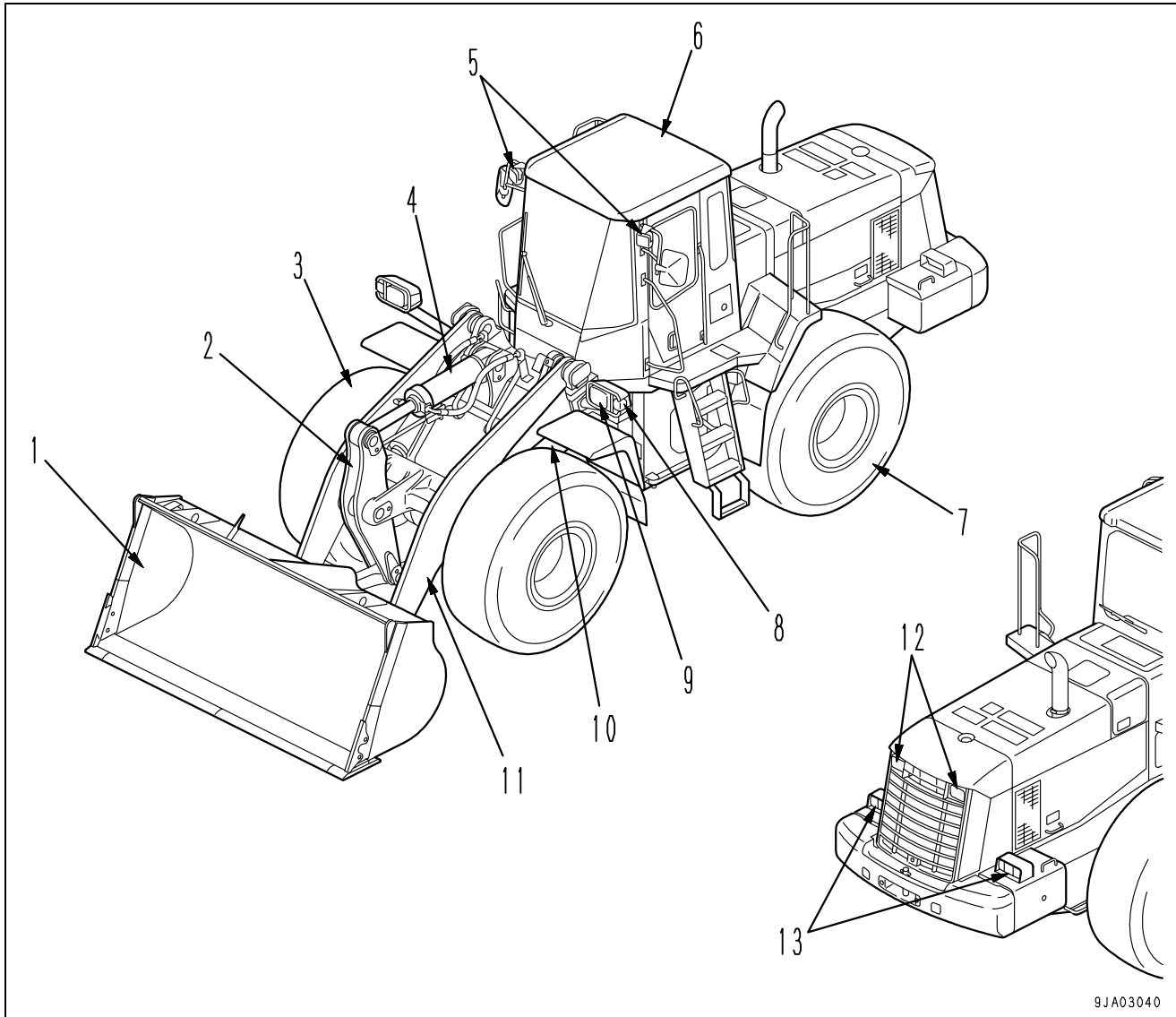
OPERATION

 **WARNING**

Please read and make sure that you understand the SAFETY section before reading this section.

GENERAL VIEW

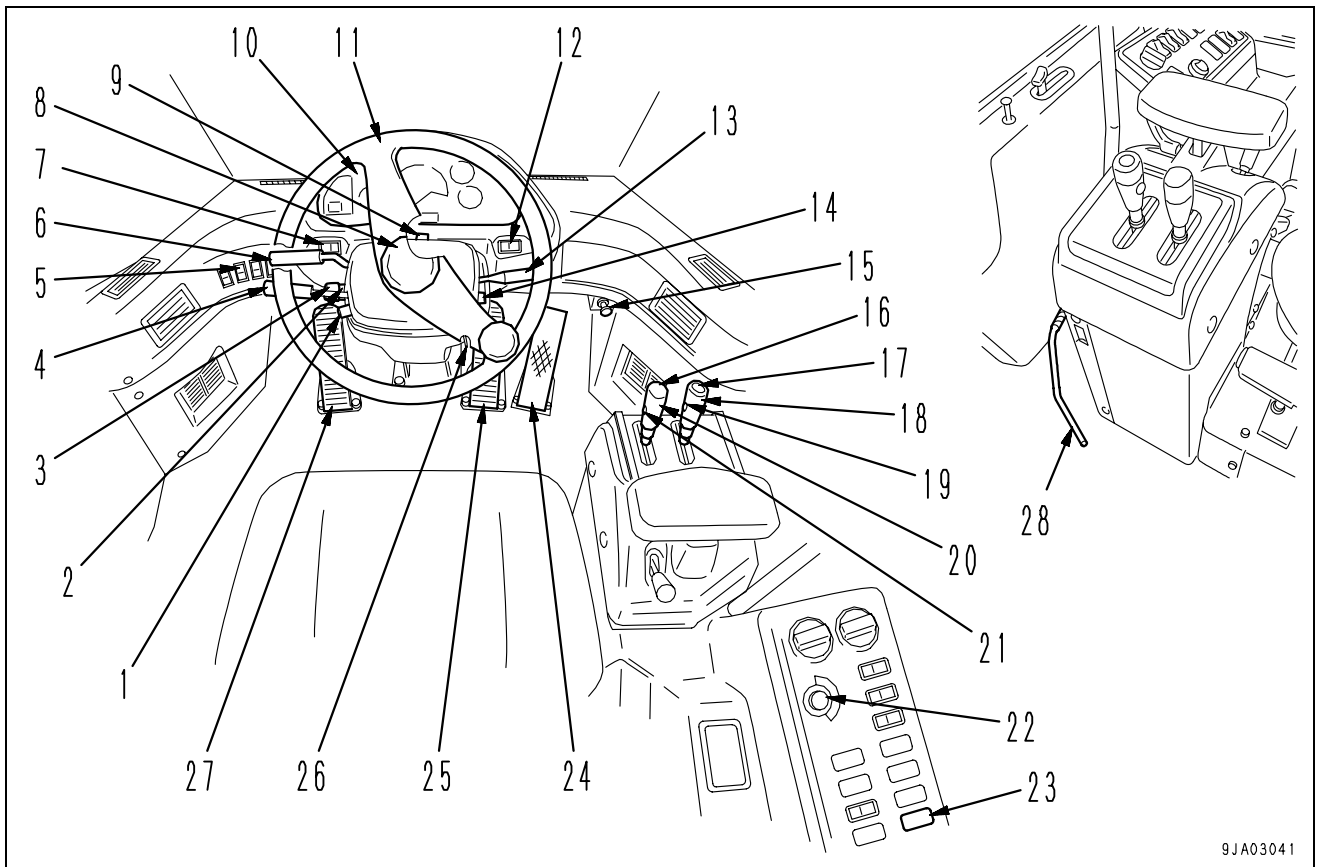
GENERAL VIEW OF MACHINE



9JA03040

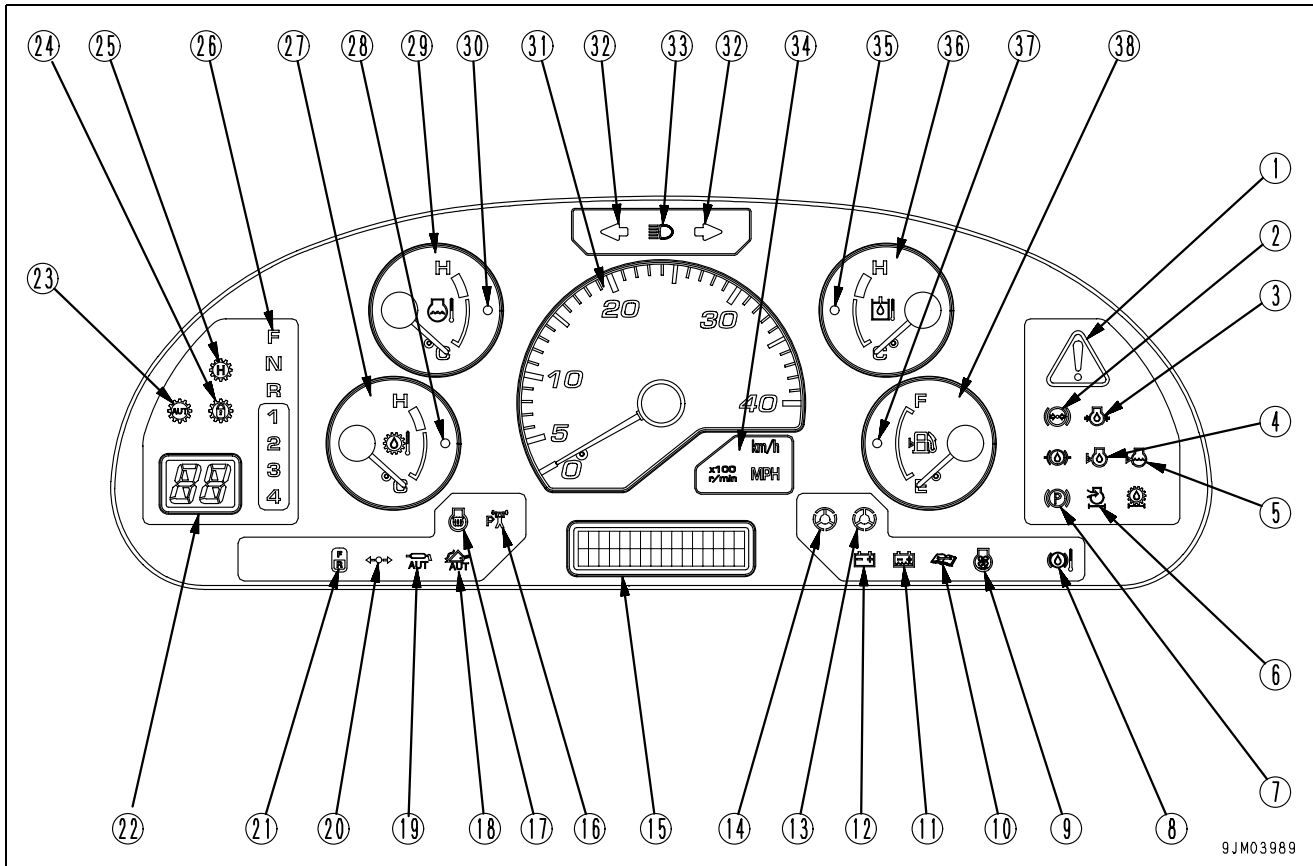
1) Bucket	(8) Turn signal lamp
(2) Tilt lever	(9) Head lamp
(3) Front wheel	(10) Lift cylinder
(4) Bucket cylinder	(11) Lift arm
(5) Front working lamp	(12) Rear working lamp
(6) ROPS cab	(13) Rear combination lamp
(7) Rear wheel	

GENERAL VIEW OF CONTROLS AND GAUGES



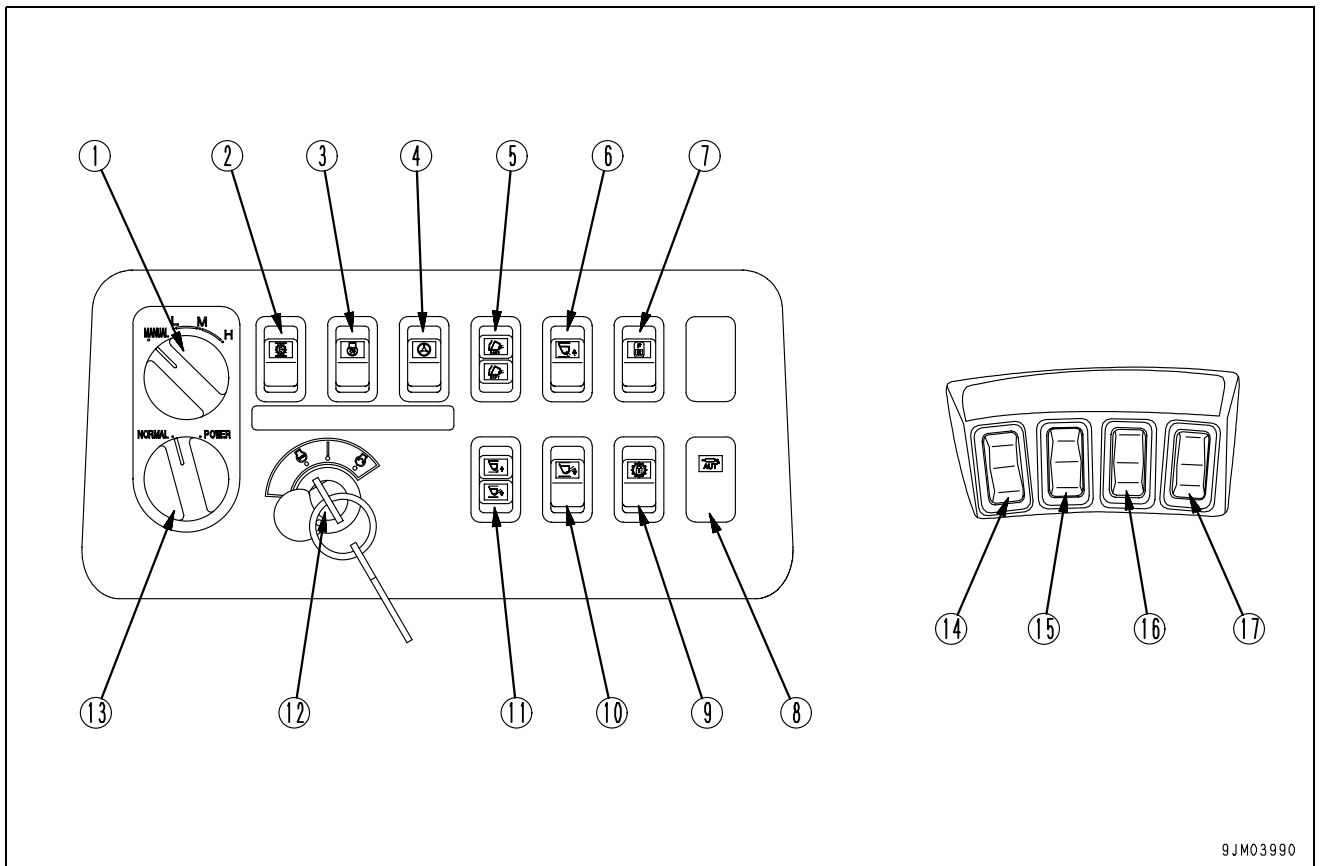
(1) Directinal lever stopper	(14) Parking brake switch
(2) Rear wiper switch	(15) Cigarette lighter
(3) Front wiper switch	(16) Load meter cancel switch (option)
(4) Speed control lever	(17) Kickdown switch
(5) Front switch panel	(18) Lift arm control lever
(6) Directinal lever	(19) Hold switch
(7) E.C.S.S. switch	(20) Bucket control lever
(8) Horn switch	(21) Load meter subtotal switch (option)
(9) Hazard lamp switch	(22) Starting switch
(10) Machine monitor	(23) Right switch panel
(11) Steering wheel	(24) Accelelator pedal
(12) Transmission cut-off switch	(25) Right brake pedal
(13) Lamp switch	(25) Right brake pedal
(13) Turn signal lever	(26) Steering tilt lock lever
(13) Dimmer switch	(27) Left brake pedal
	(28) Safety lock lever

MACHINE MONITOR



(1) Central warning lamp	(20) Joystick pilot lamp (option)
(2) Brake oil pressure caution lamp	(21) Directional selector pilot lamp (option)
(3) Engine oil pressure caution lamp	(22) Shift indicator
(4) Engine oil level caution lamp	(23) Auto-shift pilot lamp
(5) Radiator water level caution lamp	(24) Lockup pilot lamp (option)
(6) Air cleaner clogging caution lamp	(25) Shift hold pilot lamp
(7) Parking brake pilot lamp	(26) Shift lever position pilot lamp
(8) Axle oil temperature caution lamp	(27) Torque converter oil temperature gauge
(9) Cooling fan reverse rotation pilot lamp	(28) Torque converter oil temperature caution lamp
(10) Maintenance caution lamp	(29) Engine water temperature gauge
(11) Battery electrolyte level caution lamp (option)	(30) Engine cooling water temperature caution lamp
(12) Battery charge circuit caution lamp	(31) Speedometer
(13) Steering oil pressure caution lamp	(32) Turn signal pilot lamp
(14) Emergency steering pilot lamp	(33) Head lamp high beam pilot lamp
(15) Character display	(34) Meter display pilot lamp
(16) Output mode pilot lamp (power mode)	(35) Hydraulic oil temperature caution lamp
(17) Preheating pilot lamp	(36) Hydraulic temperature gauge
(18) Semi auto digging pilot lamp (option)	(37) Fuel level caution lamp
(19) Auto-greasing pilot lamp	(38) Fuel gauge

SWITCH PANEL



9JM03990

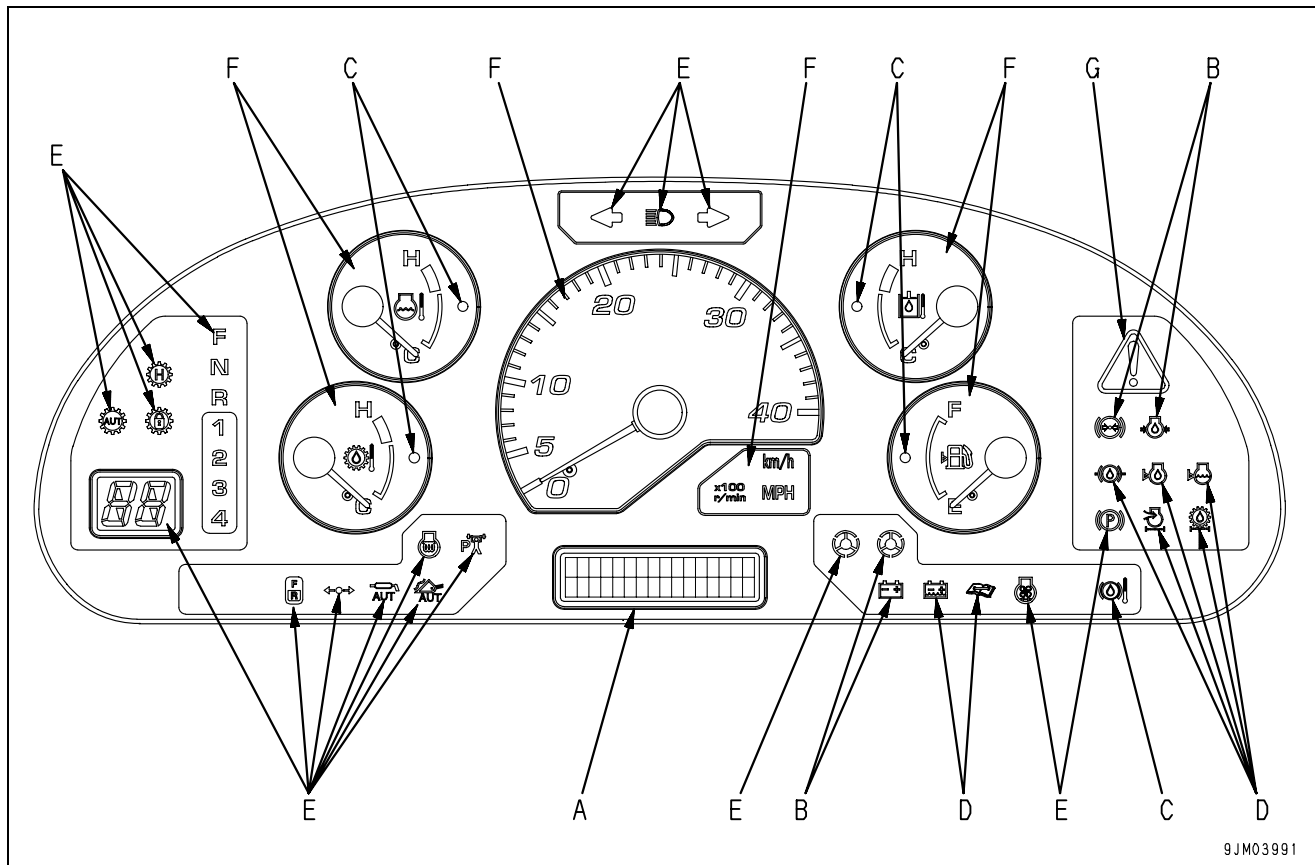
RIGHT SWITCH PANEL	FRONT SWITCH PANEL
(1) Transmission shift mode selector switch	(14) Monitor panel mode selector switch 1
(2) Transmission cut-off set switch	(15) Monitor panel mode selector switch 2
(3) Cooling fan reverse rotation switch	(16) Front working lamp switch
(4) Emergency steering switch	(17) Rear working lamp switch
(5) Semi auto digging switch (if equipped)	
(6) Remote positioner raise mode switch (if equipped)	
(7) Directional selector actuation switch (if equipped)	
(8) Auto-greasing switch	
(9) Torque converter lock-up switch (if equipped)	
(10) Remote positioner lower mode switch (if equipped)	
(11) Remote positioner raise/lower set switch (if equipped)	
(12) Starting switch	
(13) Power mode selector switch	

EXPLANATION OF COMPONENTS

The following is an explanation of the devices needed for operating the machine.

To carry out suitable operations correctly and safely, it is important to understand fully the methods of operating the equipment and the meanings of the displays.

MACHINE MONITOR



9JM03991

A: Character display	E: Pilot display
B: Emergency stop items	F: Meter display
C: CAUTION items	G: Central warning lamp
D: Inspection and maintenance items	

NOTICE

When turning the starting switch to the ON position before starting the engine, the central warning lamp, caution lamps, and pilot lamps light up for 2 seconds to check the system.

- After the alarm buzzer sounds for 2 seconds, it goes off if the condition is normal.
- The shift indicator display shows “88” for 2 seconds.
- The indicator gauges and meters are actuated after the above system check is completed.
- The character display shows “KOMATSU SYSTEM CHECK” for 3 seconds.
- If the lamps do not light up, there is probably a failure or disconnection, so contact your Komatsu distributor for inspection.

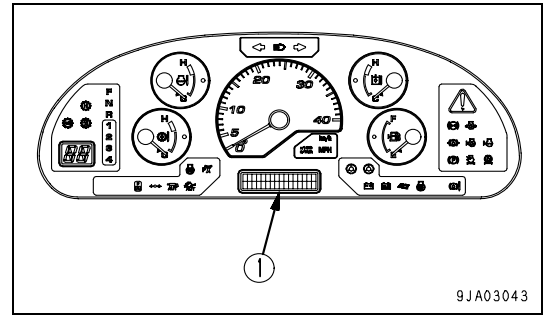
TYPES OF WARNING

If an abnormality occurs on the machine, or if any switch or lever is operated mistakenly, the monitor display and buzzer give a warning to inform the operator.

There are the following types of warning depending on the level of danger.

REMARK

For details of action codes “E03” to “E00“, see “ACTION CODE DISPLAY (3-9)“.



EMERGENCY STOP

This warning is given if there is a serious failure that affects the normal operation of the machine or if the setting is incorrect.

The central warning lamp on the monitor and the caution lamp for the location of the abnormality light up, and at the same time, the alarm buzzer sounds and action code “E03“ is displayed on character display (1).

CAUTION

This warning is given if the cooling water or lubricating oil overheat.

The central warning lamp on the monitor and the individual caution lamps light up, and at the same time, the alarm buzzer sounds and action code “E02“ is displayed on character display (1).

MISTAKEN OPERATION

This warning is given if any switch or lever is operated mistakenly.

The central warning lamp on the monitor lights up, and at the same time, the alarm buzzer sounds and action code “E00“ is displayed on character display (1).

If there is an individual caution lamp for the mistaken operation, it flashes when the buzzer sounds.

INSPECTION AND MAINTENANCE

This warning is given if it is necessary to carry out inspection and maintenance of wear parts, or if it is necessary to check the oil or cooling water level.

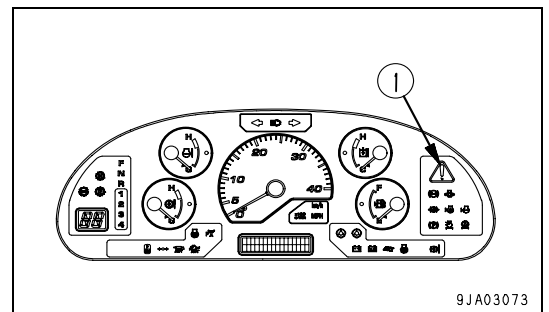
The individual caution lamp on the monitor lights up, and at the same time, action code “E01“ is displayed on character display (1).

In the case of this warning, the central warning lamp does not light up and the alarm buzzer does not sound.

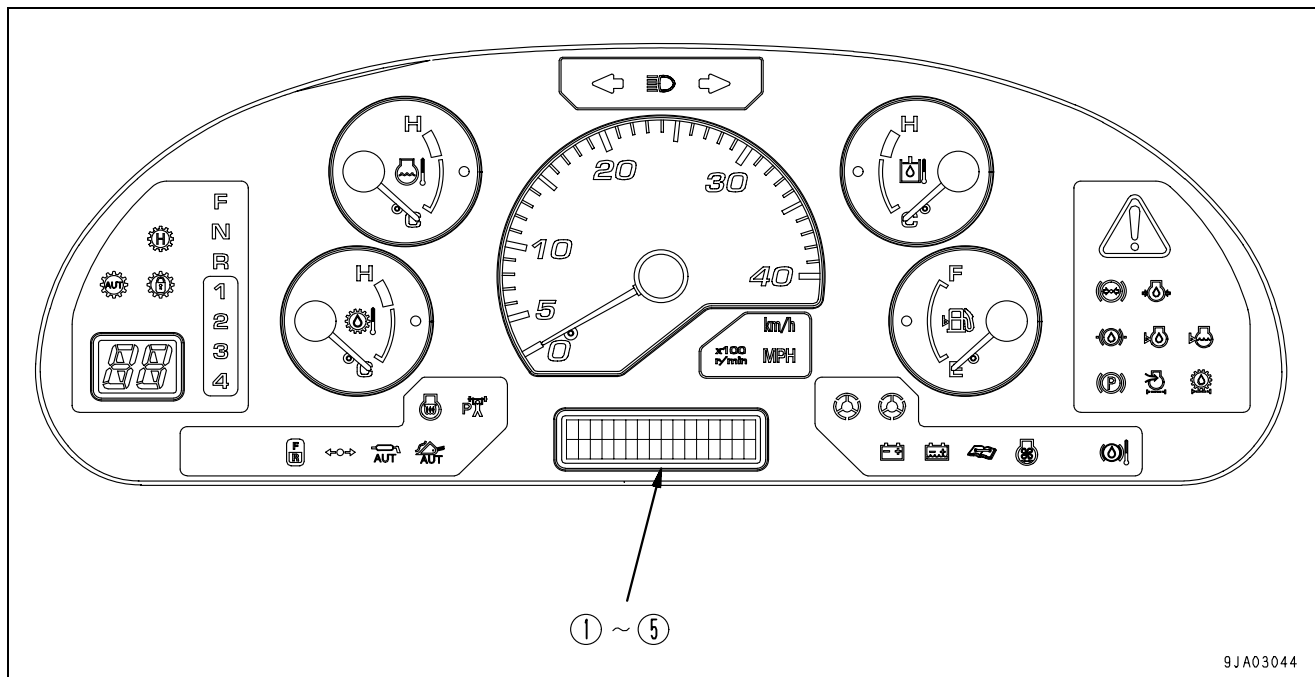
CENTRAL WARNING LAMP

This display portion (1) lights up if any emergency stop item, caution item, or mistaken operation of any switch or lever occurs. At the same time, the alarm buzzer sounds.

Check the content of the display and carry out the specified action for the item.



CHARACTER DISPLAY PORTION



(1) Service meter	(3) Action code display
(2) Clock (only machines equipped with optional load meter)	(4) Failure code display
	(5) Filter, oil replacement time display

Normally, the service meter is displayed on the character display.

If the machine has failed, or if there has been excessive load on the machine, or if it is necessary to carry out inspection and maintenance, an action code is displayed to recommend suitable action.

When the time for replacing the filter or changing the oil is reached, after completion of the system check with the starting switch at the ON position, the maintenance monitor caution lamps flash or light up, and at the same time, the filter or oil to be replaced is displayed.

NOTICE

Information regarding the failure of the machine or maintenance is displayed on the character display when the starting switch is at the ON position, check the display to confirm that there is no abnormality before starting to travel.

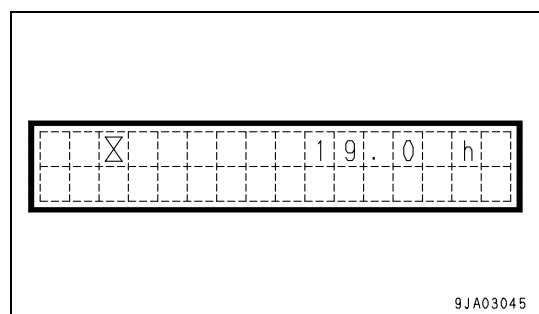
SERVICE METER

This meter (1) shows the total time that the machine has been operating.

While the engine is running, the service meter advances even if the machine is not moving.

The meter advances by 1 for every hour of operation, regardless of the engine speed.

Even if the starting switch is at the OFF position, the service meter will display as long as the top part (◇) of monitor panel mode selector switch 1 is being pressed.



NOTICE

When the starting switch is at the OFF position, if the service meter is displayed even although the top (◇) of monitor panel mode selector switch 1 is not being pressed, there is probably a failure in the machine, so please contact your Komatsu distributor for inspection.

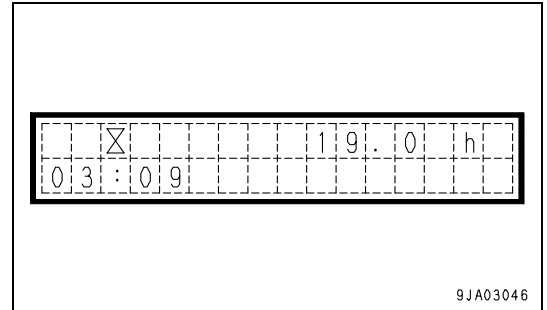
CLOCK

(only machines equipped with optional load meter)

This display portion (2) shows the time.

For details of the method of adjusting the time, see “METHOD OF SETTING TIME ON CLOCK (6-22)” in the ATTACHMENT AND OPTIONS section.

Even when the starting switch is at the OFF position, the time is displayed while the top (◇) position of monitor panel mode selector switch 1 is being pressed.



ACTION CODE DISPLAY

⚠ WARNING

If action code E03 is displayed, stop the machine immediately and check the failure code. For details, see “FAILURE CODE DISPLAY (3-11)”. Inform your Komatsu distributor of the failure code and ask for repairs.

If there is a failure on the machine, or it is necessary to change the method of operation, or if inspection or maintenance must be carried out, action code E00, E01, E02, or E03 is displayed on the character display in display portion (3).

If different failures occur at the same time, the action code for the more serious problem is displayed.

The level of seriousness is as follows, starting with the most serious: E03, E02, E01, E00.

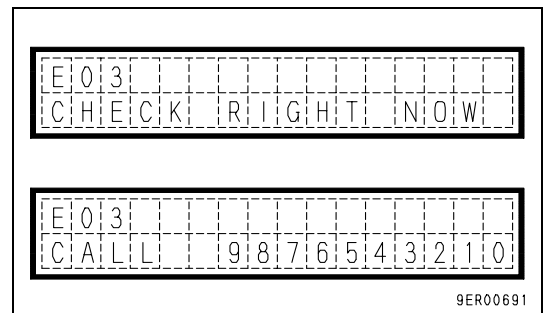
In the case of action codes E00, E02, and E03, the alarm buzzer sounds intermittently and the central warning lamp lights up.

If action codes E00, E01, E02, or E03 are displayed on the character display, stop operations, check the content of the display, and take the following action.

E03: When this code is displayed, stop the machine immediately, check the failure code, and contact your Komatsu distributor for repairs.

REMARK

- The top line of the character display displays “E03” and the bottom line displays “CHECK RIGHT NOW” and “CALL” in turn for 3 seconds each.
- The telephone number is displayed on the right of the “CALL” display. If the telephone number has not been set, there is a blank. For details of the method of setting the telephone number, see “INPUT METHOD FOR TELEPHONE NUMBER (3-33)”.



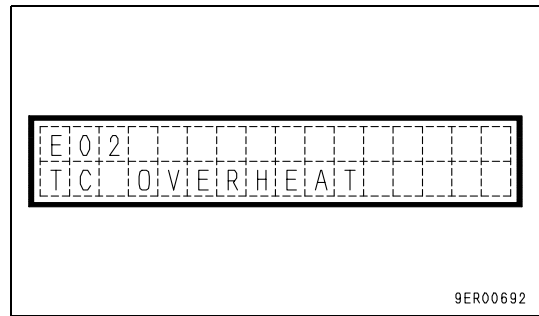
E02: If overrun related information is displayed, reduce the engine speed and the speed of the machine while continuing operations.

If the overheat related display is given, stop the machine and run the engine under no load at a mid-range speed.

If an action code is still displayed after doing this, check the failure code and contact your Komatsu distributor for repairs.

REMARK

The top line of the character display displays “E02” and the bottom line displays the condition of the machine related to overrun or overheat.



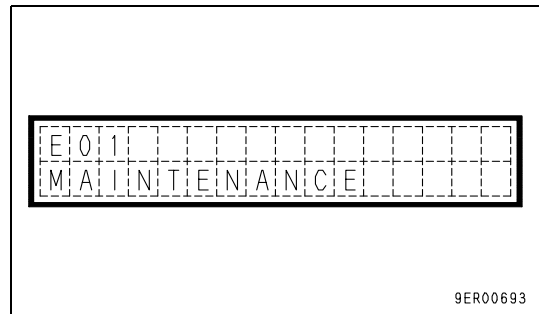
9ER00692

E01: When a failure occurs in the mechanical system, such as a drop in the level of the engine cooling water, the maintenance location is displayed and the maintenance caution lamp lights up. If this happens, carry out inspection and maintenance of the item indicated after completion of the day's work or when changing shifts.

If “MAINTENANCE” is displayed together with E01, check the failure code and ask for repairs to be carried out.

REMARK

“E01” is displayed on the top line of the character display and “MAINTENANCE or the part of the machine requiring inspection, filling of fluid, or replacement is displayed on the bottom line.

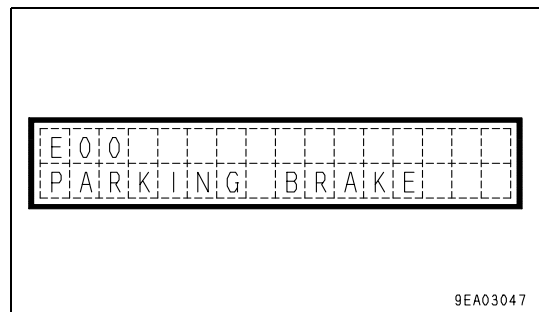


9ER00693

E00: If the parking brake has not been properly released or there is any other mistaken operation, the mistaken operation is displayed and the machine does not move as operated by the operator. Return the switches and levers to the correct position.

REMARK

“E00” is displayed on the top line of the character display and the mistaken operation is displayed on the bottom line.



9EA03047

FAILURE CODE DISPLAY

If an action code is displayed on the character display, check the failure code according to the failure code display method given below.

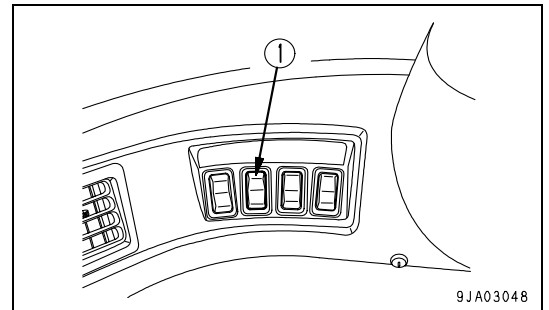
When contacting your Komatsu distributor to request repairs, please inform your distributor of the failure code.

Method of displaying failure code

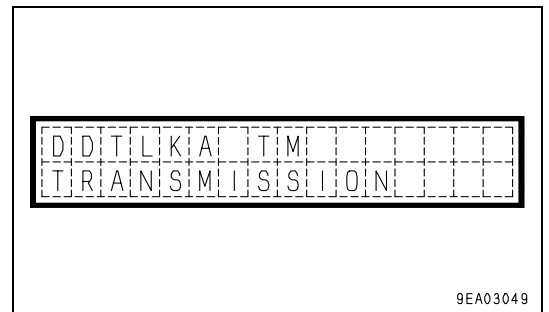
1. If an action code is displayed on the character display of display portion (4), press the top (>) of monitor panel mode selector switch 2 (1).

The action code will change to the failure code.

- The failure code is displayed with the first 6 digits on the left of the top line of the character display.
- The code displayed after the space on the right side of the failure code indicates the controller that detected the failure code.
- The component causing the failure is displayed on the bottom line of the character display.



Top right code	Controller detecting failure code
MON	Machine monitor
TM	Transmission controller
ENG	Engine controller
ENG	Work equipment controller (if equipped)

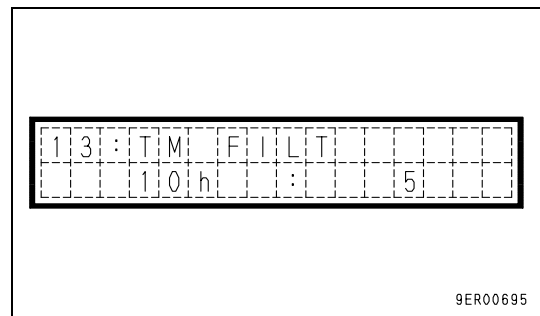


2. Press the top (>) of monitor panel mode selector switch 2 (1) again.
 If the condition is normal, the service meter is displayed for several seconds, then the display returns to the action code.
 If more than one failure has occurred at the same time, the next failure code is displayed.

FILTER, OIL REPLACEMENT TIME DISPLAY

After completion of the system check when the starting switch is turned ON, if any filter or oil item is approaching the replacement time, this display (5) shows the item for approx. 30 seconds. When this happens, the maintenance caution lamp also flashes or lights up.

After replacing the filter or changing the oil, reset the replacement interval. For details, see "RESET METHOD FOR FILTER, OIL REPLACEMENT TIME (3-32)".



REMARK

- The top line of the character display shows the ID No. and item name for the item needing replacement; the bottom line shows the time remaining until replacement and the total number of times the replacement has been carried out.
- If the replacement time has already passed, a minus (-) sign appears before the time.
- After the display has been given for 30 seconds, it does not appear again until the starting switch is turned to the ON position.
- The message in the illustration above is not shown on the character display if an action code is being displayed.
- If there are two or more items to be displayed, the display changes repeatedly every three seconds. If there are more than 10 items, all the items are displayed once each, then the display returns to the normal display.
- The display appears when there is 30 hours remaining until the filter or oil replacement time. If the replacement time has passed, a minus (-) sign appears before the time for the first 30 hours. When more than 30 hours have passed, the display is no longer given.
- The maintenance caution lamp flashes as the replacement time approaches, and after the replacement time has passed, it lights up.

Items for display of filter, oil replacement time

Item	Replacement interval (H)	Character display	ID number
Engine oil	500	ENG OIL	01
Engine oil filter	500	ENG FILT	02
Fuel filter	500	FUEL FILT	03
Corrosion resistor	1000	CORR RES	06
Transmission oil	1000	TM OIL	12
Transmission oil filter	1000	TM FILT	13
Hydraulic filter	2000	HYD FILT	04
Hydraulic tank breather element	2000	HYD BREATH	05
Hydraulic oil	2000	HYD OIL	10
Axle oil	2000	AXLE OIL	15

REMARK

See the section below for details of the procedure for replacing the filter and oil.

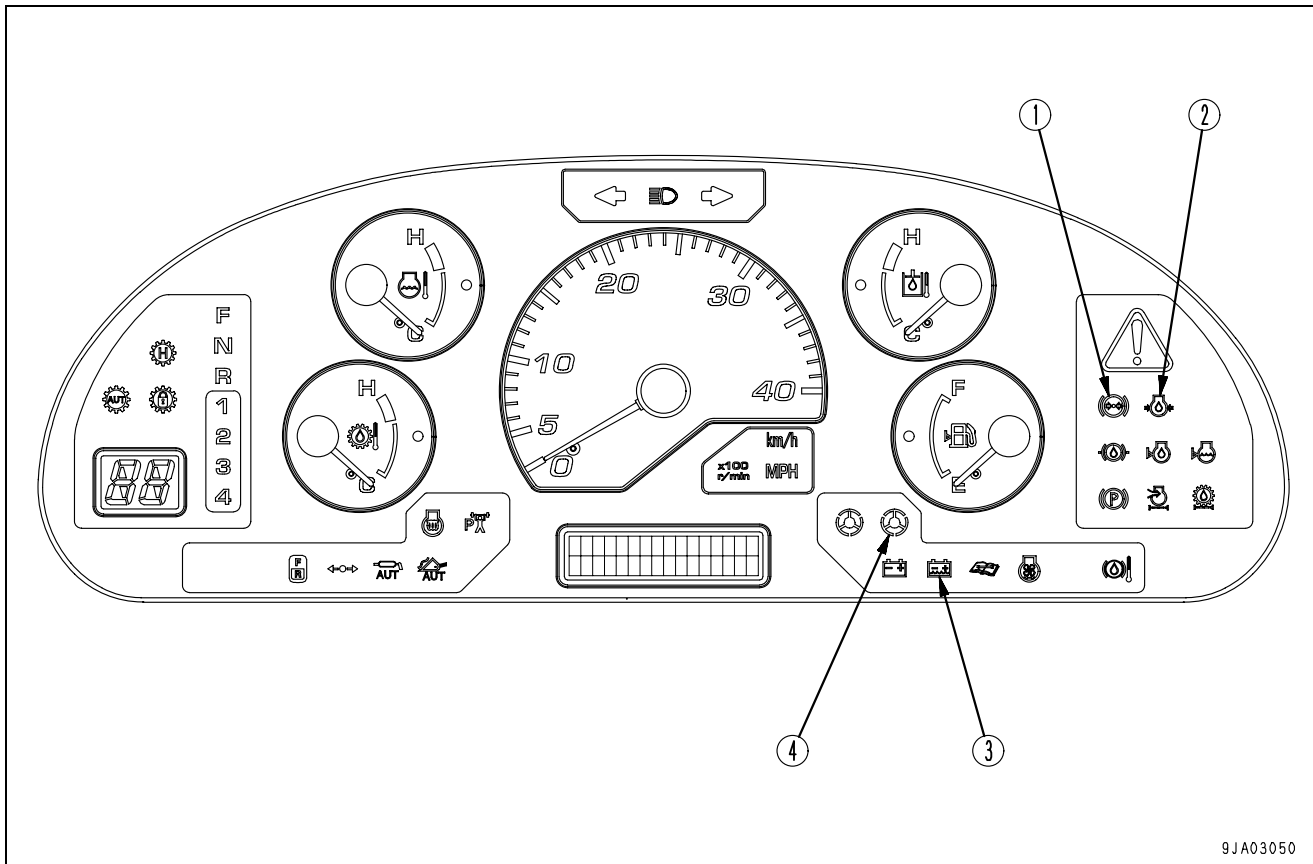
- Engine oil
“CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE (4-46)“
- Engine oil filter
“CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE (4-46)“
- Fuel filter
“REPLACE FUEL FILTER CARTRIDGE (4-47)“
- Corrosion resistor
“REPLACE CORROSION RESISTOR CARTRIDGE (4-51)“
- Transmission oil
“CHANGE OIL IN TRANSMISSION CASE AND TRANSMISSION OIL FILTER CARTRIDGE, CLEAN STRAINER (4-50)“
- Transmission oil filter
“CHANGE OIL IN TRANSMISSION CASE AND TRANSMISSION OIL FILTER CARTRIDGE, CLEAN STRAINER (4-50)“
- Hydraulic filter
“CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT (4-52)“
- Hydraulic tank breather element
“REPLACE HYDRAULIC TANK BREATHER ELEMENT (4-54)“
- Hydraulic oil
“CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT (4-52)“
- Axle oil
“CHANGE AXLE OIL (4-55)“

EMERGENCY STOP ITEM

! CAUTION

If these monitors light up and the buzzer sounds, stop operations immediately and carry out inspection and maintenance of the applicable location.

If any abnormality is found in the emergency stop items, the alarm buzzer will sound intermittently, and the monitor for the location of the abnormality and the central warning lamp will light up. At the same time, "E03 CHECK RIGHT NOW" is displayed on the character display, so stop the machine immediately in a safe place, stop the engine, and carry out inspection.



9JA03050

(1) Brake oil pressure caution lamp

(3) Battery charge circuit caution lamp

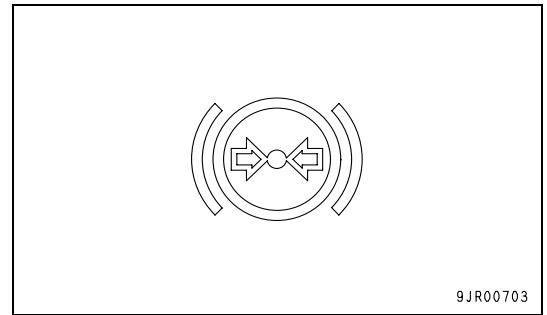
(2) Engine oil pressure caution lamp

(4) Steering oil pressure caution lamp

BRAKE OIL PRESSURE CAUTION LAMP

This monitor (1) lights up when the brake oil pressure goes below the specified value.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), the brake circuit is not actuated while the engine is stopped, so the brake oil pressure caution lamp and central warning lamp do not light up and the alarm buzzer does not sound.



During operation (engine running)

If the brake oil pressure goes down during operation, the brake oil pressure caution lamp and central warning lamp light up and the alarm buzzer sounds intermittently.

At the same time, "E03 CHECK RIGHT NOW" is displayed on the character display, so stop the machine immediately in a safe place, stop the engine, and carry out inspection.

If the brake oil pressure caution lamp lights up, the service brake may not work, so keep the parking brake applied to prevent the machine from moving.

In addition, when the accumulator is being charged immediately after starting the engine, the brake oil pressure caution lamp will light up, but the central warning lamp remains OFF and the alarm buzzer does not sound.

Keep the parking brake applied to prevent the machine from moving until the brake pressure becomes normal and the brake oil pressure caution lamp goes out.

ENGINE OIL PRESSURE CAUTION LAMP

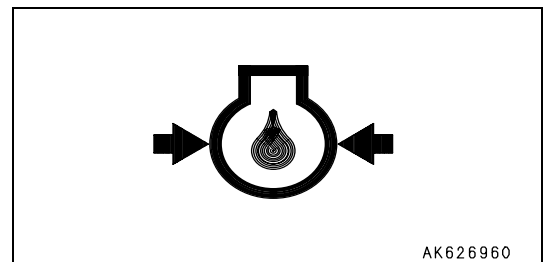
This monitor (2) lights up to warn the operator that the engine lubricating oil pressure has dropped.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

During operation (engine running)

If the engine lubricating oil pressure goes down during operation, the engine lubricating oil pressure caution lamp and central warning lamp light up and the alarm buzzer sounds intermittently.

At the same time, "E03 CHECK RIGHT NOW" is displayed on the character display, so stop the machine immediately in a safe place, stop the engine, and carry out inspection.



BATTERY CHARGE CIRCUIT CAUTION LAMP

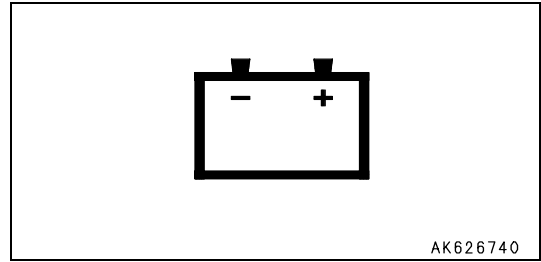
This monitor (3) lights up when the engine is running to warn the operator that an abnormality has occurred in the charging circuit.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

During operation (engine running)

If an abnormality occurs in the charging circuit during operation, the battery charge circuit caution lamp and central warning lamp light up and the alarm buzzer sounds intermittently.

At the same time, "E03 CHECK RIGHT NOW" is displayed on the character display, so stop the machine immediately in a safe place, stop the engine, and carry out inspection.



AK626740

character display, so stop the machine immedi-

STEERING OIL PRESSURE CAUTION LAMP

(Red)

This monitor (4) lights up to warn the operator that the steering oil pressure has dropped.

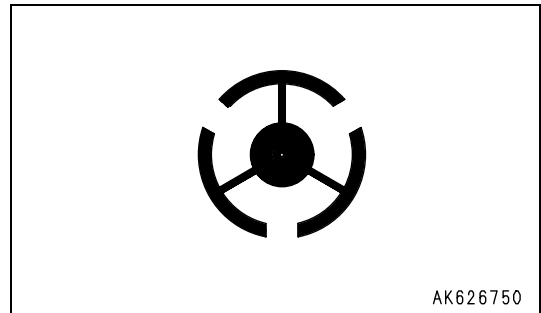
During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

However, it lights up during the self-check of the emergency steering.

During operation (engine running)

If the steering oil pressure goes down during operation, the steering oil pressure caution lamp and central warning lamp light up and the alarm buzzer sounds intermittently.

At the same time, "E03 CHECK RIGHT NOW" is displayed on the character display, so stop the machine immediately in a safe place, stop the engine, and carry out inspection.



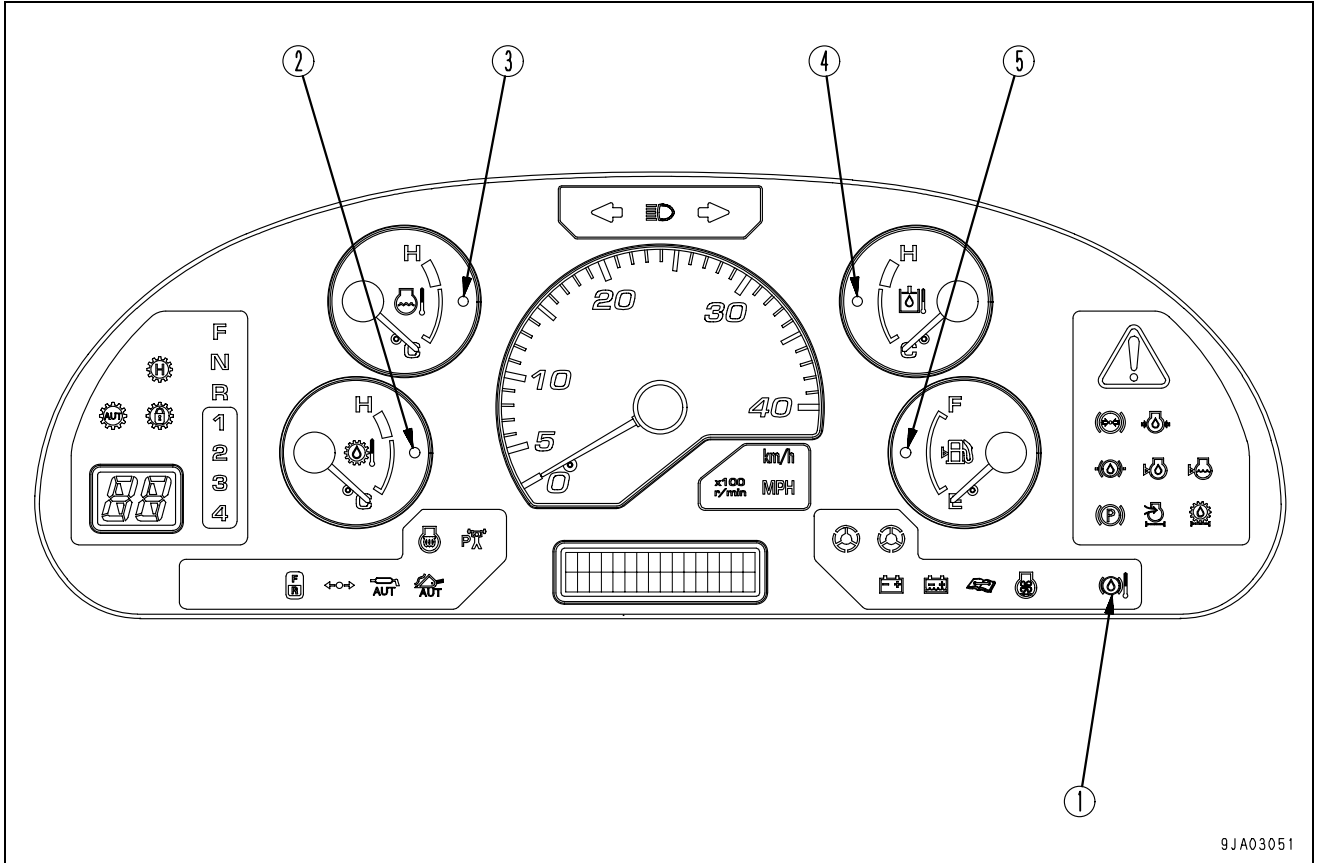
AK626750

character display, so stop the machine immedi-

CAUTION ITEMS

⚠ CAUTION

If these monitors light up, stop operations quickly and carry out the following action.



9JA03051

(1) Axle oil temperature caution lamp	(4) Hydraulic oil temperature caution lamp
(2) Torque converter oil temperature caution lamp	(5) Fuel level caution lamp
(3) Engine cooling water temperature caution lamp	

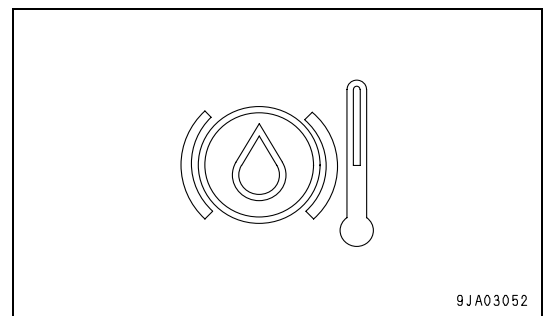
AXLE OIL TEMPERATURE CAUTION LAMP

This monitor (1) lights up to warn the operator that the brake oil temperature has risen.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

During operation (engine running)

In continuous heavy-duty operations or when traveling long distances downhill where of the brake is used frequently, the axle oil temperature becomes high so the axle oil temperature caution lamp lights up and the alarm buzzer sounds intermittently.



9JA03052

At the same time, “E02 BRAKE OVERHEAT” is displayed on the character display, so take the following action.

1. Release the accelerator pedal and move the gearshift lever down one range to reduce the travel speed.
2. Avoid using the brake.
 - 1) Do not keep the brake depressed continuously; use the brake only intermittently.
 - 2) When using the left brake pedal, turn the transmission cut-off switch ON to carry out operations.

If use of the brake is reduced for a short time in the way recommended above, the axle oil temperature will go down and the caution lamp will go out.

TORQUE CONVERTER OIL TEMPERATURE CAUTION LAMP

This monitor (2) lights up to warn the operator that the torque converter oil temperature has risen.

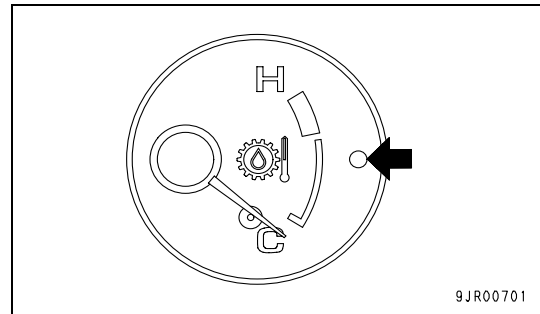
During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

During operation (engine running)

If the torque converter oil temperature rises, the torque converter oil temperature caution lamp only will light up.

If the oil temperature rises further, the central warning lamp will light up and the alarm buzzer will sound intermittently.

At the same time as the central warning lamp lights up, “E02 TC OVERHEAT” is displayed on the character display, so stop the machine and run the engine under no load at a mid-range speed until the lamp goes out.



ENGINE COOLING WATER TEMPERATURE CAUTION LAMP

This monitor (3) lights up to warn the operator that the engine cooling water temperature has risen.

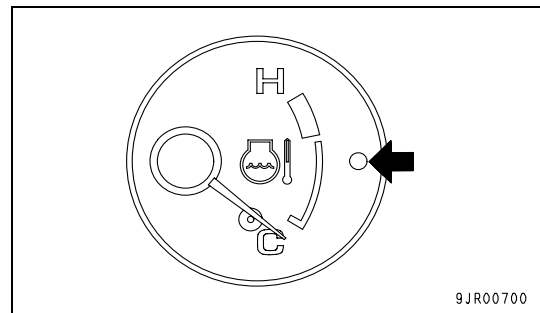
During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

During operation (engine running)

If the engine cooling water temperature rises, the engine cooling water temperature caution lamp only will light up.

If the water temperature rises further, the central warning lamp will light up and the alarm buzzer will sound intermittently.

At the same time as the central warning lamp lights up, “E02 ENGINE OVERHEAT” is displayed on the character display, so stop the machine and run the engine under no load at a mid-range speed until the lamp goes out.



HYDRAURIC OIL TEMPERATURE CAUTION LAMP

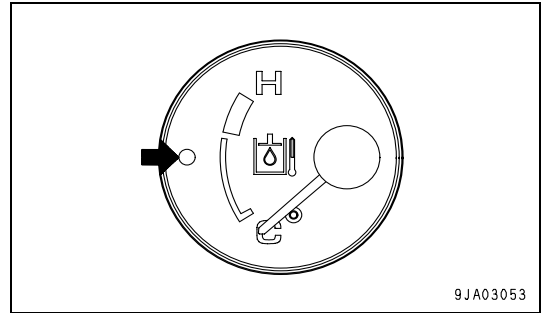
This monitor (4) lights up to warn the operator that the hydraulic oil temperature has risen.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

During operation (engine running)

If the hydraulic oil temperature rises, the hydraulic oil temperature caution lamp, the central warning lamp will light up, and the alarm buzzer will sound intermittently.

At the same time, "E02 HYD OVERHEAT" is displayed on the character display, so stop the machine and run the engine under no load at a mid-range speed until the lamp goes out.



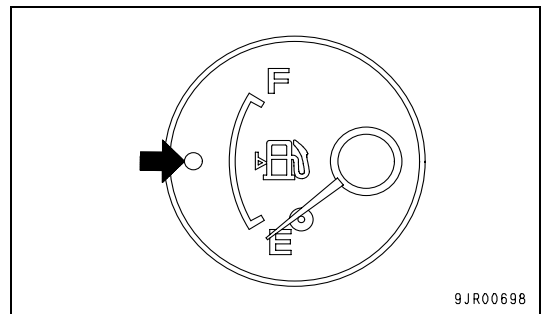
FUEL LEVEL CAUTION LAMP

This monitor (5) lights up if the amount of fuel remaining in the fuel tank goes below 36 liters (9.51 USgal).

If it lights up, check and add fuel and as soon as possible.

REMARK

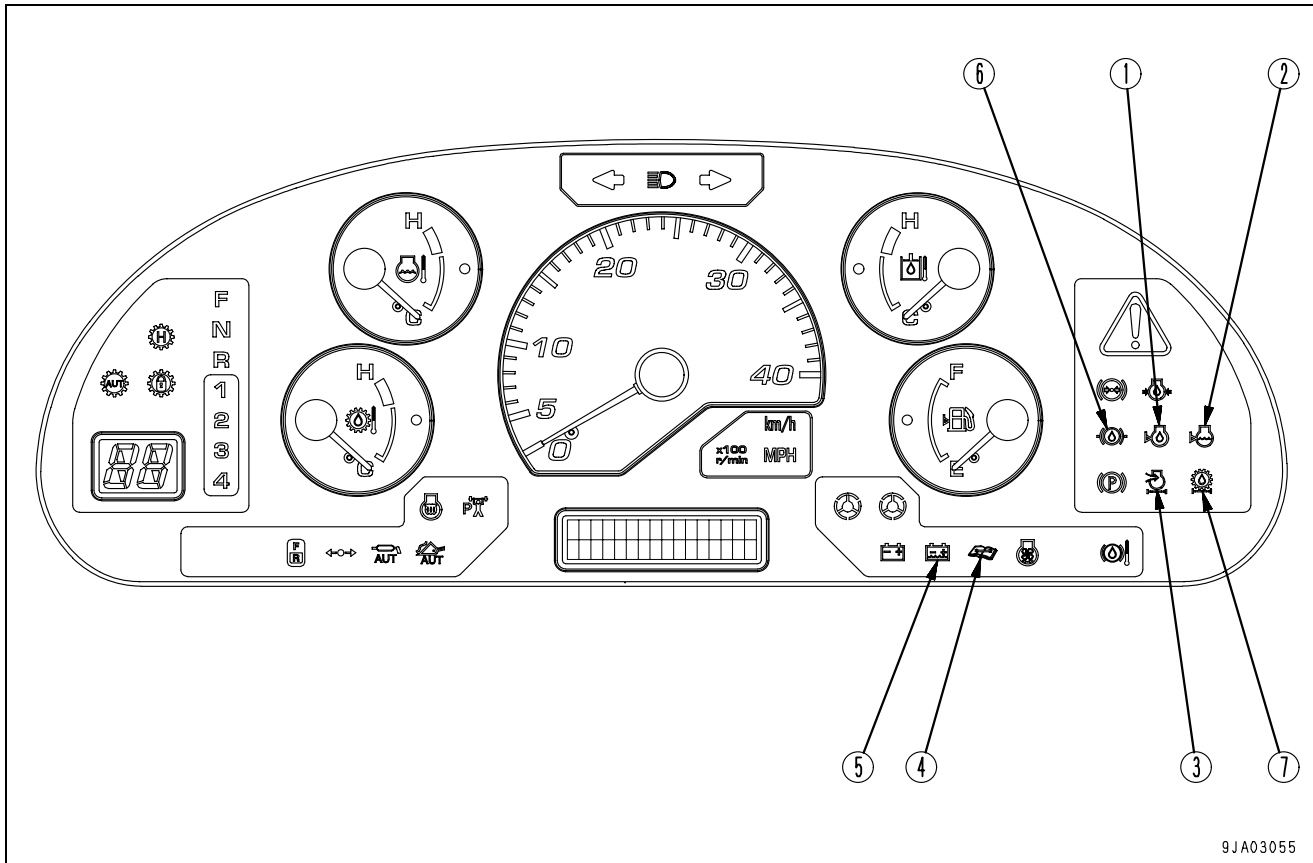
Even if the caution lamp lights up, action code "E02" is not displayed on the character display.



INSPECTION AND MAINTENANCE ITEM

⚠ CAUTION

If these monitors light up, stop operations quickly and carry out the following action.



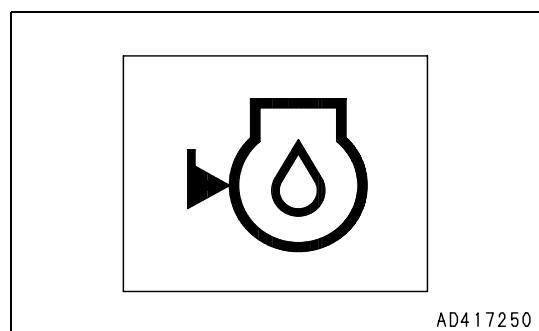
9JA03055

(1) Engine oil level caution lamp	(5) Battery electrolyte level caution lamp (option)
(2) Radiator water level caution lamp	(6) Breakeoil level caution lamp
(3) Air cleaner clogging caution lamp	(7) Transmission oil filter clogging caution lamp
(4) Maintenance caution lamp	

ENGINE OIL LEVEL CAUTION LAMP

This monitor (1) lights up to warn the operator that the oil level in the engine oil pan has gone down. During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor lights up if the oil level in the engine oil pan is low.

At the same time, "E01 ENG OIL LEV LOW" is displayed on the character display, so do not start the engine. Check the oil level in the engine oil pan and add oil.



AD417250

REMARK

During checks before starting, if the engine is started with the engine oil level caution lamp lighted up, the lamp will stay lighted up.

During operation (engine running)

If the oil level in the engine oil pan becomes too low, the engine oil level caution lamp will light up.

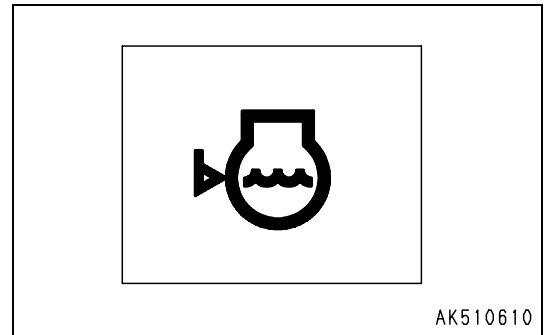
At the same time, "E01 ENG OIL LEV LOW" is displayed on the character display, so stop the engine, check the oil level in the engine oil pan, and add oil.

RADIATOR WATER LEVEL CAUTION LAMP

This monitor (2) lights up to warn the operator that the water level in the radiator has gone down.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor lights up if the water level in the radiator is low.

At the same time, "E01 COOLANT LOW" is displayed on the character display, so check the water level in the radiator and add water.



During operation (engine running)

If the water level in the radiator becomes too low, the radiator cooling water level caution lamp will light up.

At the same time, "E01 COOLANT LOW" is displayed on the character display, so stop the engine, check the water level in the radiator, and add water.

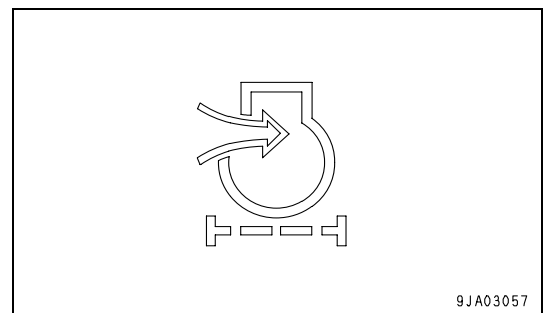
AIR CLEANER CLOGGING CAUTION LAMP

This lamp (3) lights up to warn the operator that the air cleaner is clogged.

During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor does not light up.

During operation (engine running)

If the air cleaner becomes clogged, the air cleaner clogging caution lamp will light up.



At the same time, "E01 AIR FILTER" is displayed on the character display, so stop the engine and clean or replace the element.

REMARK

It is possible to check the condition of clogging of the air cleaner with the dust indicator installed at the side of the air cleaner.

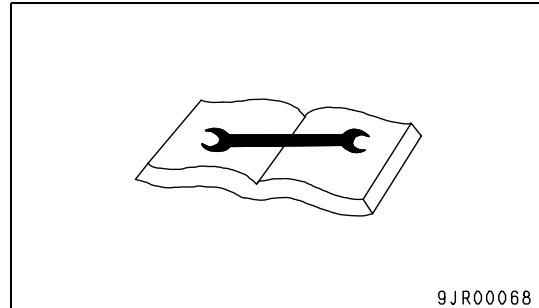
MAINTENANCE CAUTION LAMP**⚠ CAUTION**

If the caution monitor lamp lights up, repair the problem as soon as possible.

When the oil change interval is reached, this monitor (4) flashes or lights up for approx. 30 seconds after completion of the system check when the starting switch is at the ON position.

REMARK

The maintenance caution lamp flashes when there is less than 30 hours to the replacement time, and after the replacement time has passed, it lights up.



9JR00068

For details of the items covered by filter and oil replacement, see “FILTER, OIL REPLACEMENT TIME DISPLAY (3-12)”.

After replacing the filter or changing the oil, reset the replacement interval. For details, see “RESET METHOD FOR FILTER, OIL REPLACEMENT TIME (3-32)”.

BATTERY ELECTROLYTE LEVEL CAUTION LAMP

(If equipped)

This monitor (5) lights up to warn the operator that the battery electrolyte level has gone down.

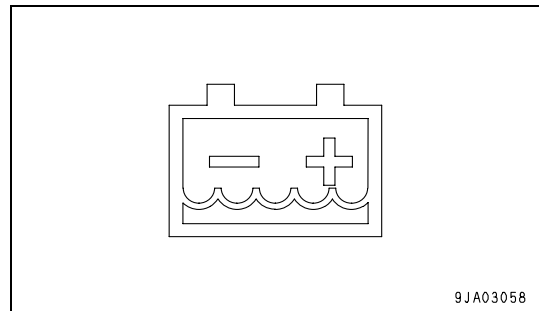
During checks before starting (when the starting switch is turned to the ON position but the engine is not started), this monitor lights up if the battery electrolyte level is low.

At the same time, “E01 BATTERY LEV LOW” is displayed on the character display, so check the electrolyte level and add distilled water.

During operation (engine running)

If the battery electrolyte level becomes too low, the battery electrolyte level caution lamp will light up.

At the same time, “E01 BATTERY LEV LOW” is displayed on the character display, so check the electrolyte level and add distilled water.

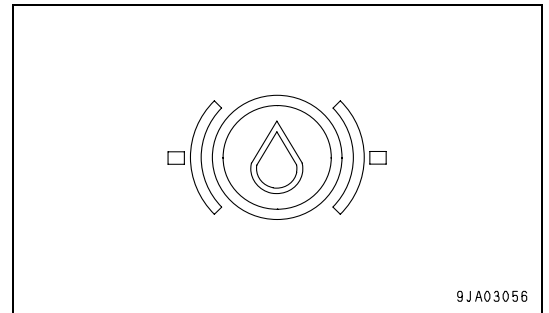


9JA03058

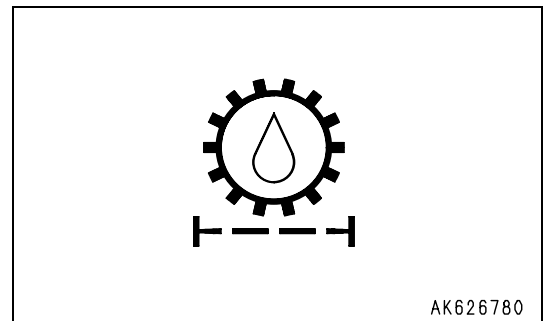
BRAKE OIL LEVEL CAUTION LAMP

This monitor (6) is not used.

On this machine, the hydraulic oil is used for the brake oil.

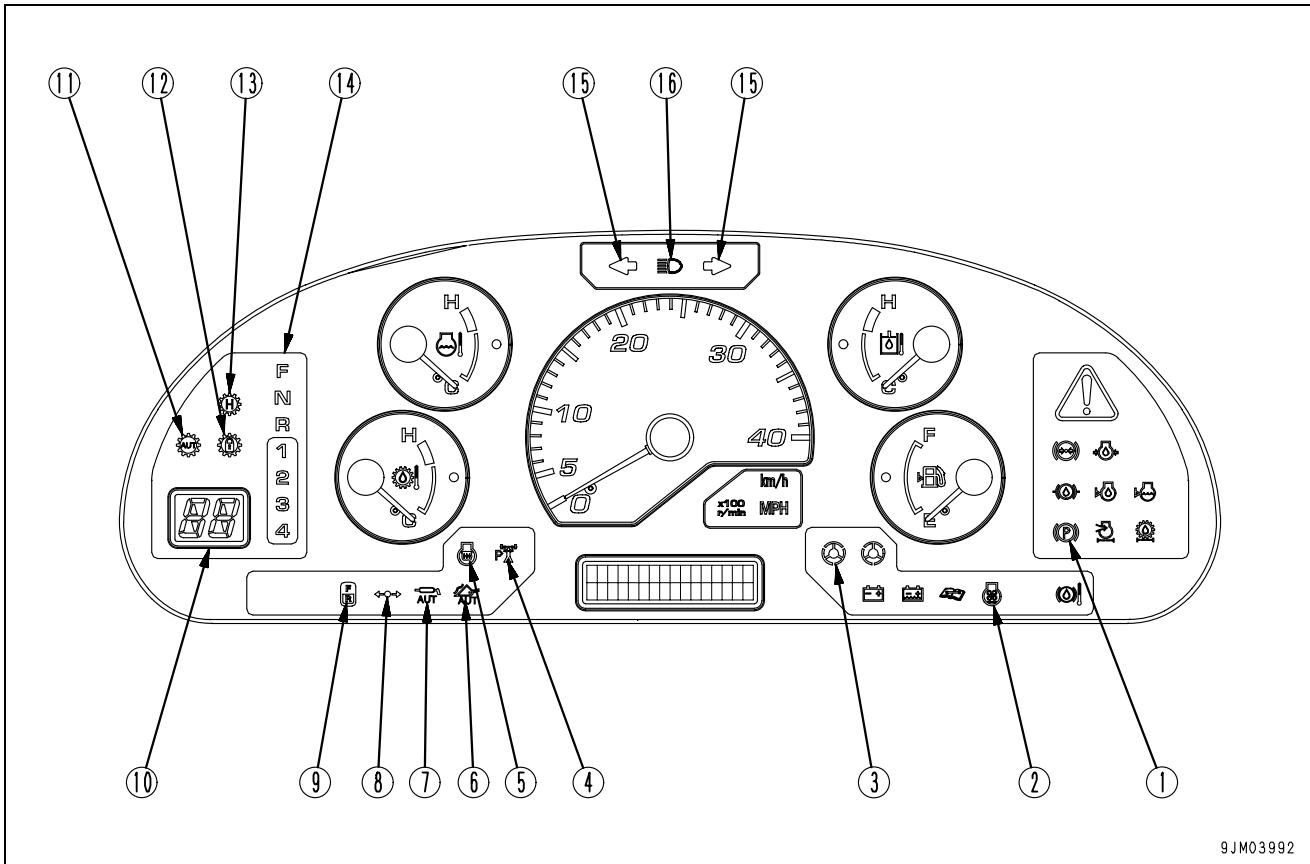
**TRANSMISSION OIL FILTER CLOGGING CAUTION LAMP**

This monitor (7) is not used.



PILOT DISPLAY PORTION

When the starting switch is ON, the pilot display lights up when the display items are functioning.

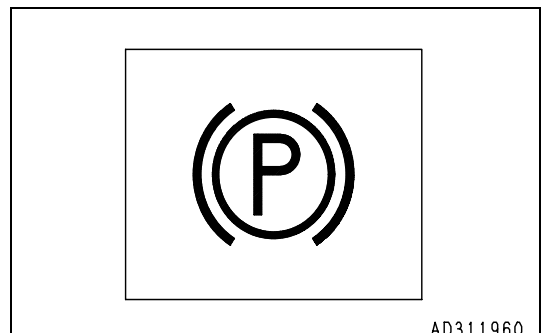


9JM03992

(1) Parking brake pilot lamp	(9) Directional selector pilot lamp (option)
(2) Cooling fan reverse rotation pilot lamp	(10) Shift indicator
(3) Emergency steering pilot lamp	(11) Aut-shift pilot lamp
(4) Output mode pilot lamp (power mode)	(12) Lockup pilot lamp (option)
(5) Preheating pilot lamp	(13) Shift hold pilot lamp
(6) Semi auto digging pilot lamp (option)	(14) Shift lever position pilot lamp
(7) Auto-greasing pilot lamp	(15) Turn signal pilot lamp
(8) Joystick pilot lamp	(16) Head lamp high beam pilot lamp

PARKING BRAKE PILOT LAMP

This monitor (1) lights up when the parking brake is applied.



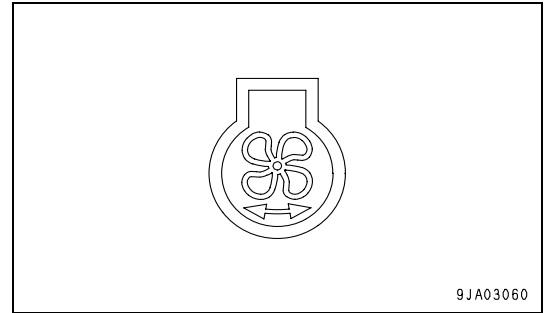
AD311960

COOLING FAN REVERSE ROTATION PILOT LAMP

This monitor (2) lights up when the direction of rotation of the cooling fan is reversed.
At the same time, "COOLING FAN REVERSE" is displayed on the character display.

REMARK

When the engine is running, even if the cooling fan reverse switch is operated, the fan does not rotate in reverse. In this case, the position of the switch and the actual direction of rotation of the fan are different, so the cooling fan reverse rotation pilot lamp flashes. Return the switch to its original position or stop the engine and operate the switch.



EMERGENCY STEERING PILOT LAMP

(Green)

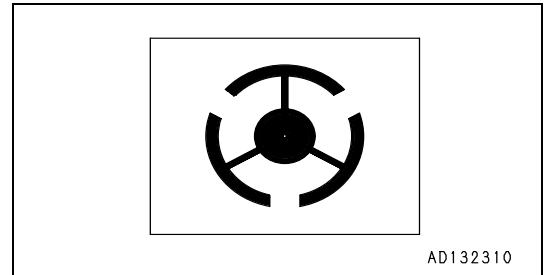
This monitor (3) lights up when the emergency steering is being actuated.

If the engine stops when the machine is traveling or an abnormality occurs in the steering oil pressure circuit, and the machine is traveling at a speed of more than 2 km/h (1.2 MPH), the emergency steering is automatically actuated and the lamp lights up.

If the lamp lights up, move the machine immediately to a safe place, stop the engine, and check the condition.

In addition, the lamp flashes if the emergency steering is actuated continuously for one minute.

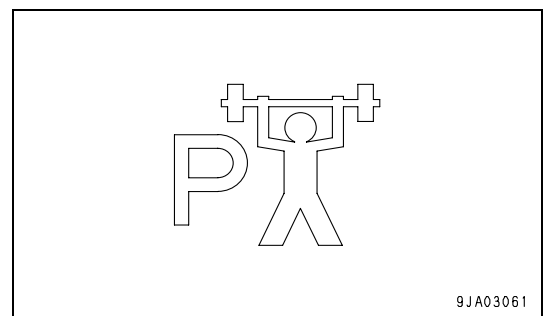
At the same time, "E02 EMR S/T OVERRUN" is displayed on the character display, so move the machine immediately to a safe place, stop the engine, and check the condition.



There is an emergency steering self-check function. For details, see "EMERGENCY STEERING SELF-CHECK FUNCTION (3-97)" in the OPERATION section.

OUTPUT MODE PILOT LAMP (POWER MODE)

This monitor (4) lights up when the power mode is selected.
Use the power mode selector switch to select the output mode.

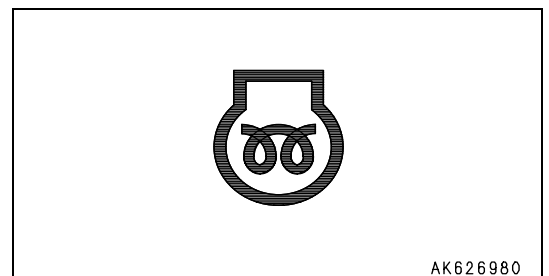


PREHEATING PILOT LAMP

This monitor (5) lights up when the engine preheating electric heater is actuated.

In cold weather, when the starting switch is turned to the ON position, this lamp lights up, and when the preheating is completed, it goes out.

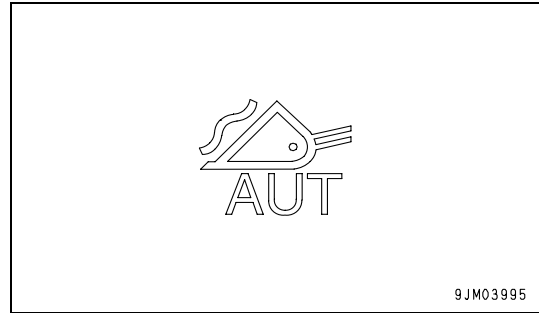
The preheating time differs according to the ambient temperature.



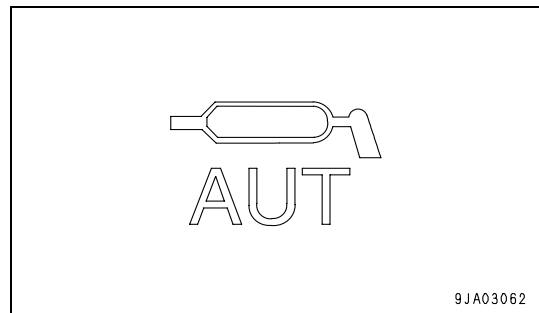
SEMI AUTO DIGGING PILOT LAMP

(If equipped)

This monitor (6) lights up when the mode is set to the semi auto digging mode and the bucket is automatically tilted.

**AUTO-GREASING PILOT LAMP**

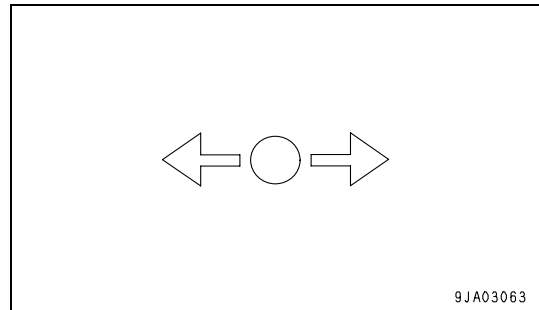
This monitor (7) lights up when the auto-greasing is actuated. If the grease tank is empty, this lamp flashes (1 Hz) and if there is any abnormality in the auto-greasing system, it flashes rapidly (2 Hz).

**JOYSTICK PILOT LAMP**

(If equipped)

This monitor (8) lights up when the joystick switch is turned ON.

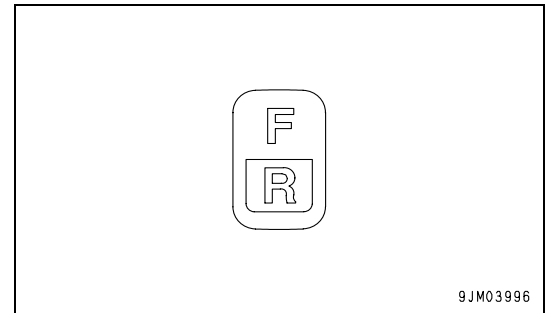
For details, see "HANDLING JOYSTICK STEERING SYSTEM (6-45)".



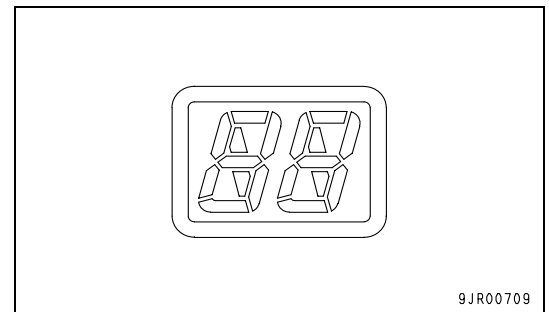
DIRECTIONAL SELECTOR PILOT LAMP

This monitor (9) lights up when the directional selector switch actuation switch on the right switch panel is turned ON to make it possible to switch the direction of travel between FORWARD and REVERSE with the directional selector switch at the side of the lift arm control lever.

For details, see "CHANGING DIRECTION (3-91)".

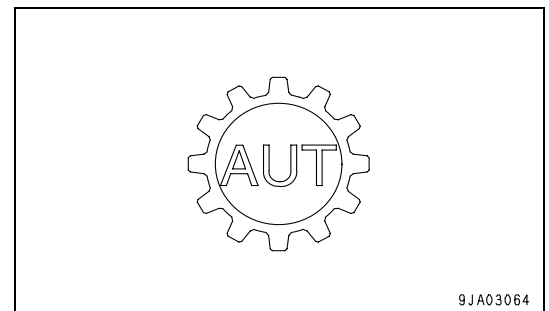
**SHIFT INDICATOR**

This monitor (10) indicates the transmission gear range (actual travel speed range).

**AUTO-SHIFT PILOT LAMP**

This monitor (11) lights up when the auto-shift function is selected.

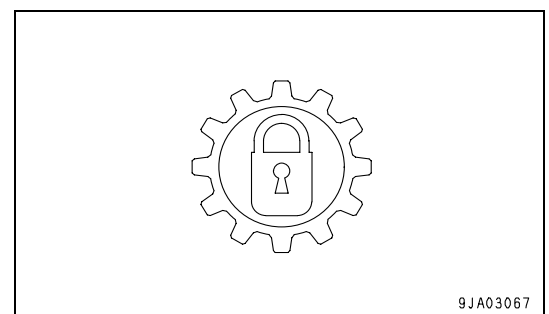
Use the MANUAL/AUTO-SHIFT selector switch to select the shift mode.

**LOCKUP PILOT LAMP**

(If equipped)

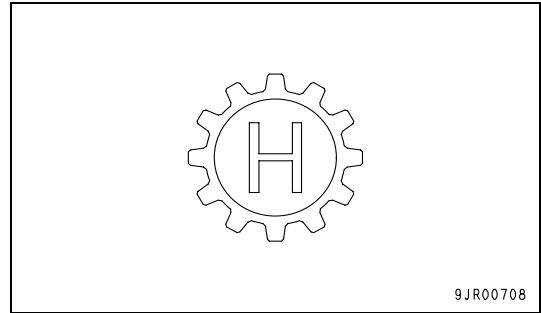
This monitor (12) lights up when the torque converter lock-up is engaged and the transmission is set to direct drive.

For details, see "HANDLING TORQUE CONVERTER LOCK-UP (6-27)" in the ATTACHMENT AND OPTION section.



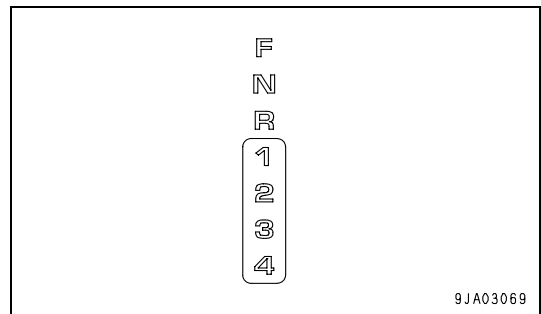
SHIFT HOLD PILOT LAMP

This monitor (13) lights up when the shift hold is actuated.



SHIFT LEVER POSITION PILOT LAMP

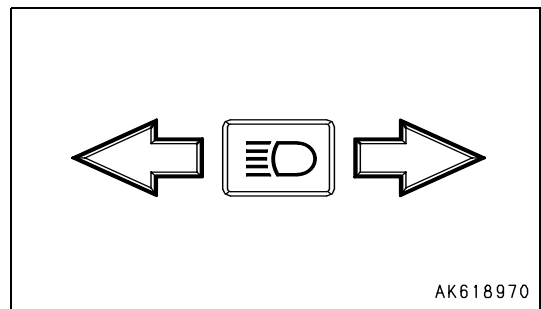
This monitor (14) displays the transmission position of the gearshift lever.



TURN SIGNAL PILOT LAMP

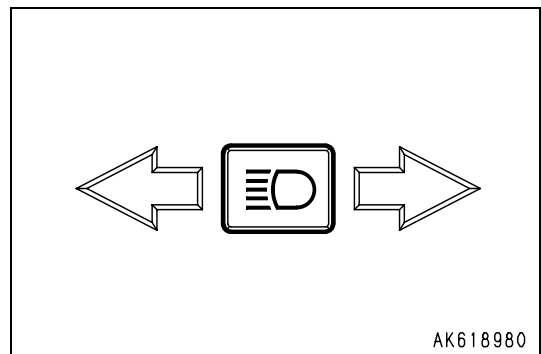
This monitor (15) flashes at the same time as the turn signal lamp flashes.

If there is a disconnection in the turn signal indicator lamp, the flashing interval becomes shorter.

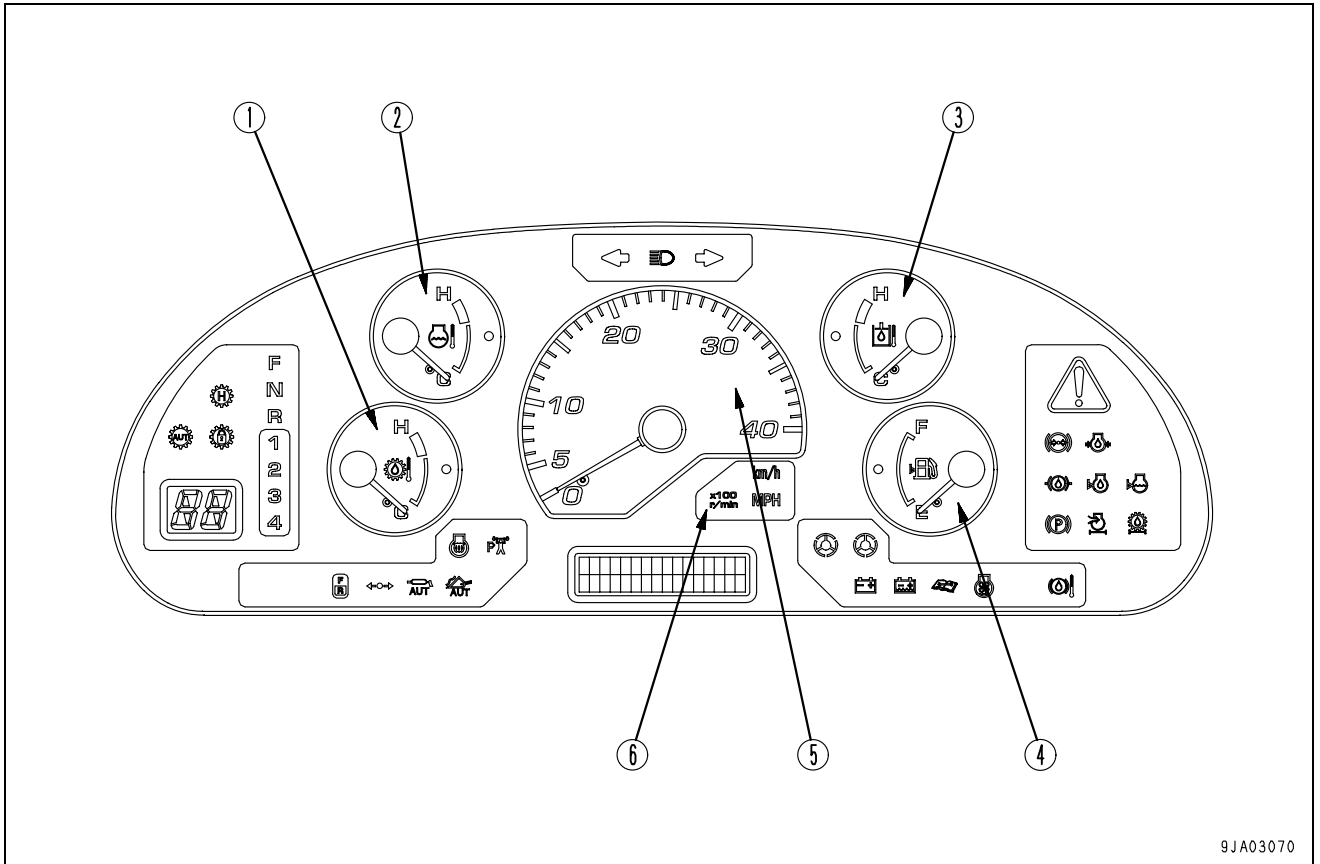


HEAD LAMP HIGH BEAM PILOT LAMP

This monitor (16) lights up when the head lamps are set to high beam.



METER DISPLAY PORTION

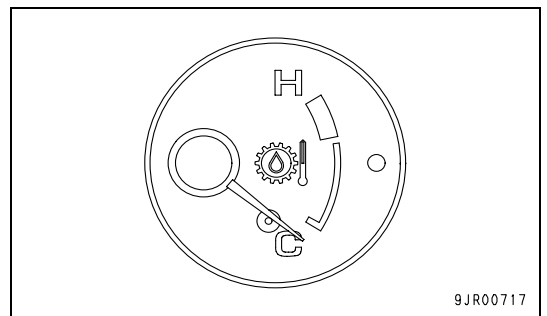


9JA03070

(1) Torque converter oil temperature gauge	(4) Fuel gauge
(2) Engine water temperature gauge	(5) Speedometer
(3) Hydraulic temperature gauge	(6) Meter display pilot lamp

TORQUE CONVERTER OIL TEMPERATURE GAUGE

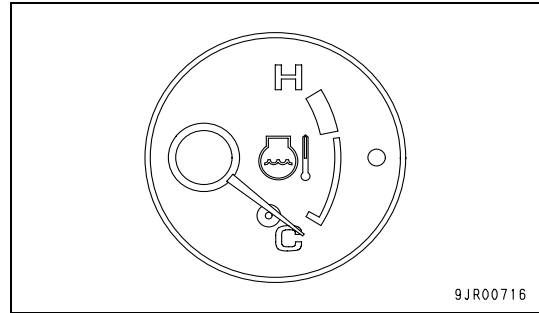
This meter (1) indicates the torque converter oil temperature. It should be in the white range during operation. If it is in the red range during operation, the alarm buzzer will sound and the central warning lamp will light up. "E02 TC OVERHEAT" is displayed on the character display, so run the engine under no load at a mid-range speed and wait until the meter enters the white range.



9JR00717

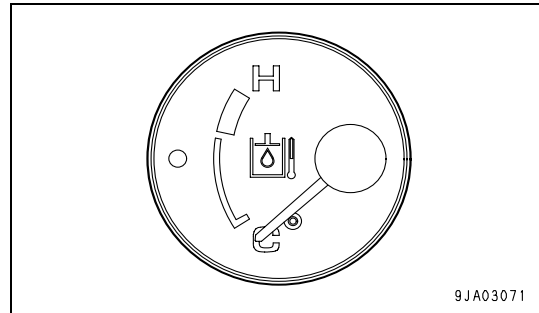
ENGINE WATER TEMPERATURE GAUGE

This meter (2) indicates the engine water temperature. It should be in the white range during operation. If it is in the red range during operation, the alarm buzzer will sound and the central warning lamp will light up. "E02 ENGINE OVERHEAT" is displayed on the character display, so run at the engine under no load at a mid-range speed and wait until the meter enters the white range. If it is in the red range, the engine output is automatically limited.



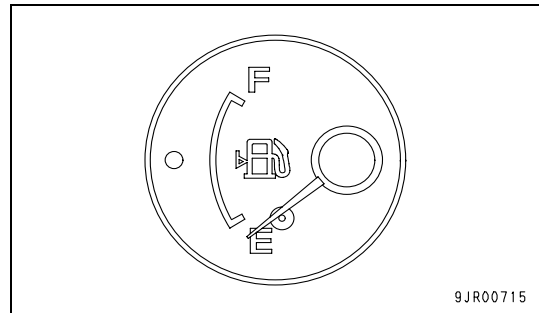
HYDRAURIC TEMPERATURE GAUGE

This meter (3) indicates the hydraulic oil temperature. During normal operations, it should be in the white range. If it enters the red range during operation, the alarm buzzer will sound and the central warning lamp will light up at the same time. "E02 HYD OVERHEAT" is displayed on the character display, so run the engine under no load at a mid-range speed and wait until the indicator returns to the white range.



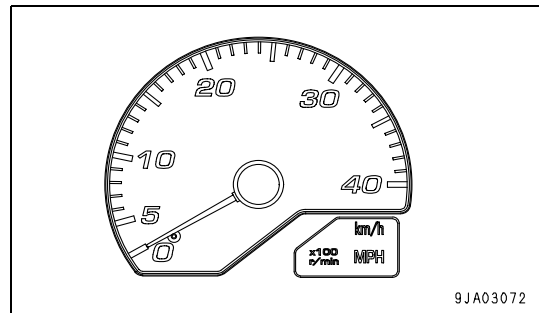
FUEL GAUGE

This meter (4) indicates the amount of fuel remaining in the fuel tank. F: Full tank E: Fuel level is low When the amount of remaining fuel goes below 30 liters (7.93 US gal), the caution lamp inside the fuel gauge lights up. If it lights up, check and add fuel.



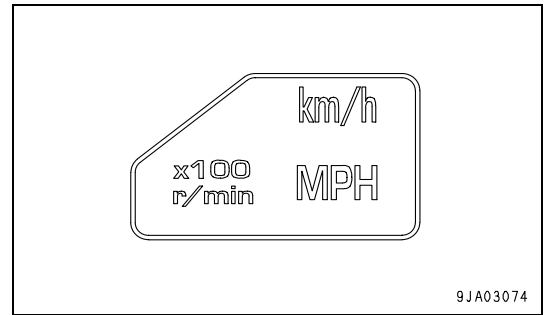
SPEEDOMETER

This meter (5) indicates the travel speed of the machine. The display unit is indicated on meter display pilot lamp (6). It is also possible to display the engine speed by switching meter (5). If you wish to switch between the speedometer and tachometer, please contact your Komatsu distributor to have it switched.



METER DISPLAY PILOT LAMP

This lamp (6) displays the unit for the travel speed or engine tachometer.



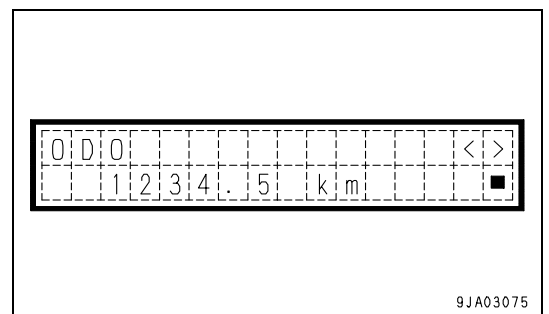
OTHER FUNCTIONS OF MACHINE MONITOR

The machine monitor also has the following functions. Odometer, filter/oil replacement time reset, telephone number input, language selection, monitor brightness adjustment

METHOD OF DISPLAYING ODOMETER

Use this when checking the total distance that the machine has traveled.

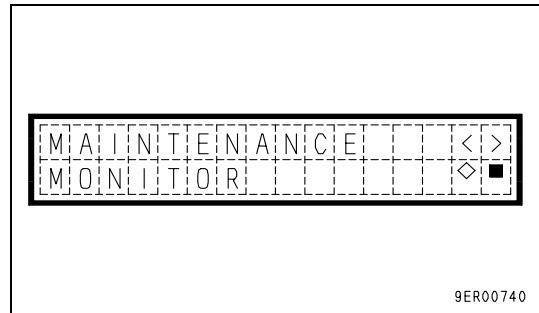
1. Check that the character display is showing the service meter or the action code. If it is giving any other display, turn the starting switch OFF, then turn the starting switch to the ON position and wait for the above display to be given.
2. Press the (◇) of monitor panel mode selector switch 1. It displays the odometer.
3. When completing the operation, press (■) of monitor panel mode selector switch 1 or turn the starting switch OFF.



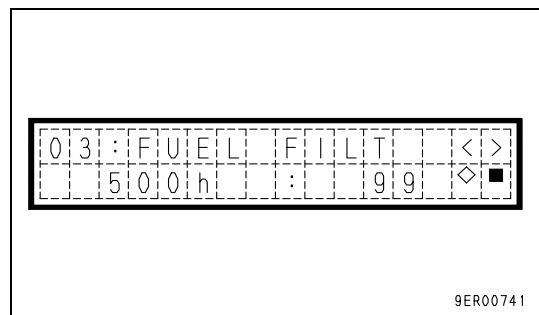
RESET METHOD FOR FILTER, OIL REPLACEMENT TIME

The filter and oil replacement time is displayed on the character display, so if the filter and oil have been replaced, reset the filter and oil change time.

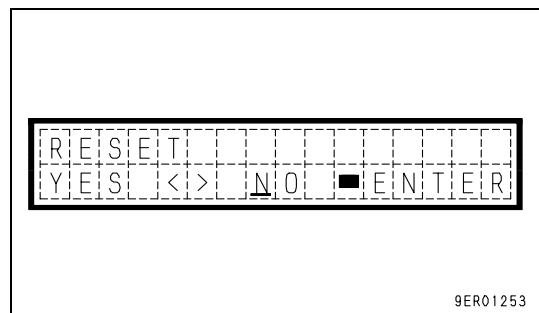
1. Press the (◇) of monitor panel mode selector switch 1, and display the odometer.
2. Press (>) or (<) of monitor panel selector switch 2 and display "MAINTENANCE MONITOR".



3. Press the (◇) of monitor panel mode selector switch 1. It will change to the display in the diagram on the right. The bottom line shows two items: the replacement time on the left and the total number of times the item has been replaced on the right.
4. Press the (>) or (<) monitor panel mode selector switch 2 to display the item (filter or oil) which has reached the replacement time.



5. Press the (◇) of monitor panel mode selector switch 1. It will change to the display in the diagram on the right. The top line shows [Reset] and [Item to be reset] in turn.
6. When resetting the replacement time, press (■) of machine monitor mode selector switch 1. It will reset and returned to the previous screen. To abandon, align the cursor with "NO", then press (■) of monitor panel mode selector switch 1.

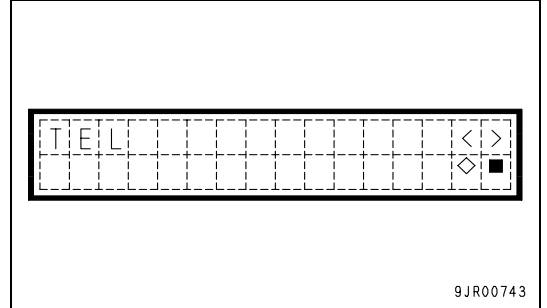


7. When resetting the replacement time for another item, carry out the procedure from Step 4. After completing, press (■) of monitor panel mode selector switch 1 twice or turn the starting switch OFF.

INPUT METHOD FOR TELEPHONE NUMBER

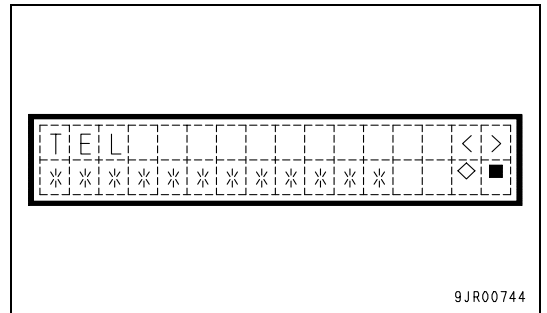
It is possible to display the telephone number on the right side of "CALL" displayed on the character display when action code "E03" is generated.

- 1. Press the (◇) of monitor panel mode selector switch 1, and display the odometer.
- 2. Press (>) or (<) of monitor panel selector switch 2 and display "TEL".



- 3. Press (◇) of monitor panel mode selector switch 1. It will change to the display in the diagram on the right.

Once the telephone number is input, the input number will be displayed next time.

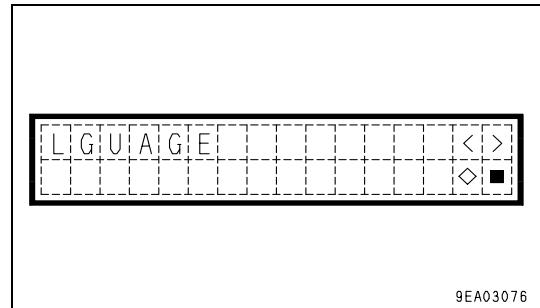


- 4. Up to 12 digits can be displayed for the telephone number. Input from the first digits. The cursor is displayed at the input position. Press (>) or (<) of monitor panel mode selector switch 2 and display "0-9". To leave a blank, select "*". When the input value is decided, press (◇) of monitor panel mode selector switch 1. The cursor will move to the next position.
- 5. Repeat the procedure in Step 4 until the last digit. At the last digit, press (◇) of monitor panel mode selector switch 1 to return to the previous screen. If there is a mistake in the input or the input is to be stopped, press (■) of monitor panel mode selector switch 1 to return to the previous screen.
- 6. When completing the operation, press (■) of monitor panel mode selector switch 2 twice or turn the starting switch OFF.

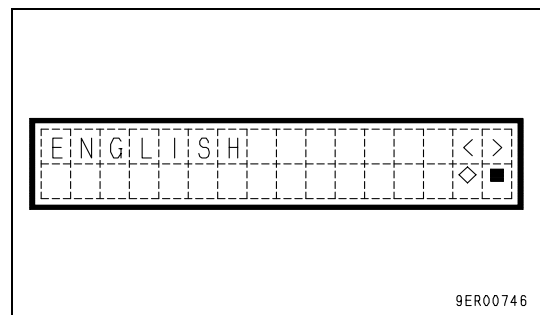
METHOD FOR SELECTING LANGUAGE

Use this when switching the language displayed on the character display.
 The following explanation is for when english is set as the language for the character display.

1. Press the (◇) of monitor panel mode selector switch 1, and display the odometer.
2. Press (>) or (<) of monitor panel selector switch 2 and display "LGUAGE".



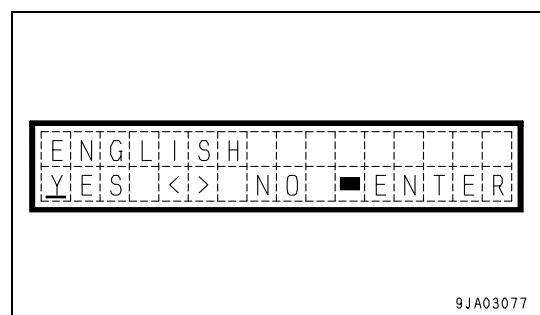
3. Press the (◇) of machine mode panel selector switch 1. The presently selected language is displayed.
4. Press the (>) or (<) monitor panel mode selector switch 2 and select the language.



The available languages are English, Japanese, German, French, Italian, Spanish, and Swedish.

Language	Display
English	ENGLISH
Japanese	日本語*
German	DEUTSCH
Franch	FRANCAIS
Italian	ITALIANO
Spanish	Español
Swedish	SVENSKA

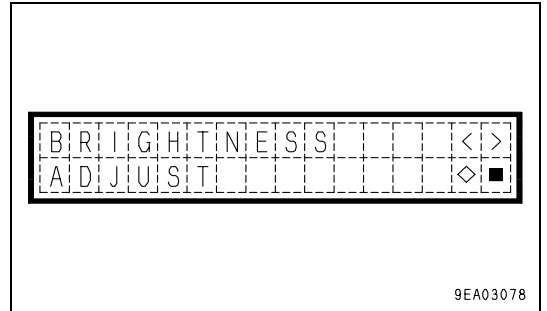
5. After selecting the language, press the (◇) of monitor panel mode selector switch 1.
 To confirm, set the cursor at "YES", then press the (■) of monitor panel mode selector switch 1. The language will be selected and the screen will return to the previous screen.
 To abort, set the cursor at "NO", then press the (■) of monitor panel mode selector switch 1.
6. When completing the operation, press (■) of monitor panel mode selector switch 2 twice or turn the starting switch OFF.



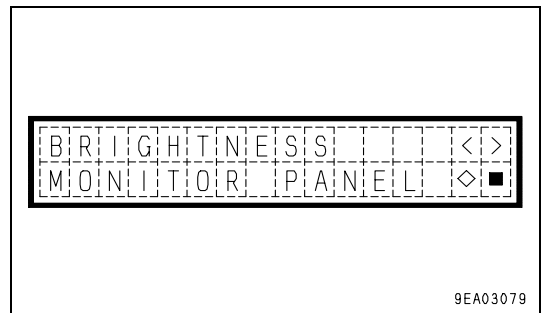
METHOD OF ADJUSTING MONITOR BRIGHTNESS

Do as follows to adjust the brightness of the monitor.

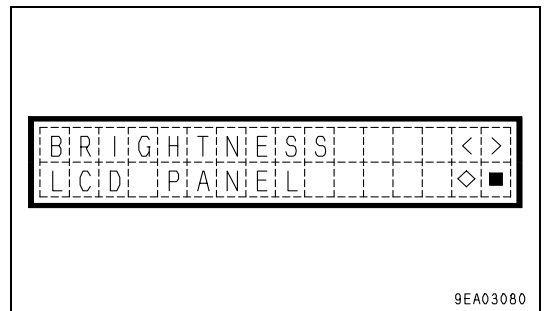
1. Press the (◇) of monitor panel mode selector switch 1, and display the odometer.
2. Press the (>) or (<) monitor panel mode selector switch 2 and display "BRIGHTNESS ADJUST".



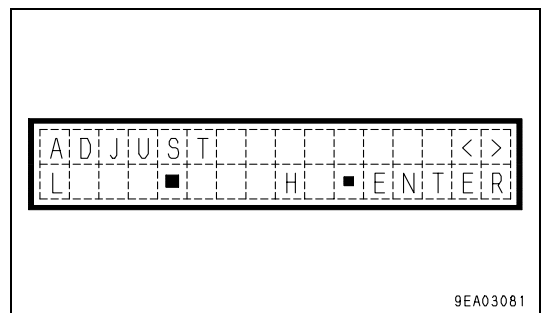
3. Press the (◇) of monitor panel mode selector switch 1. "MONITOR PANEL" will be displayed on the bottom line and it will be possible to adjust the brightness of the monitor.



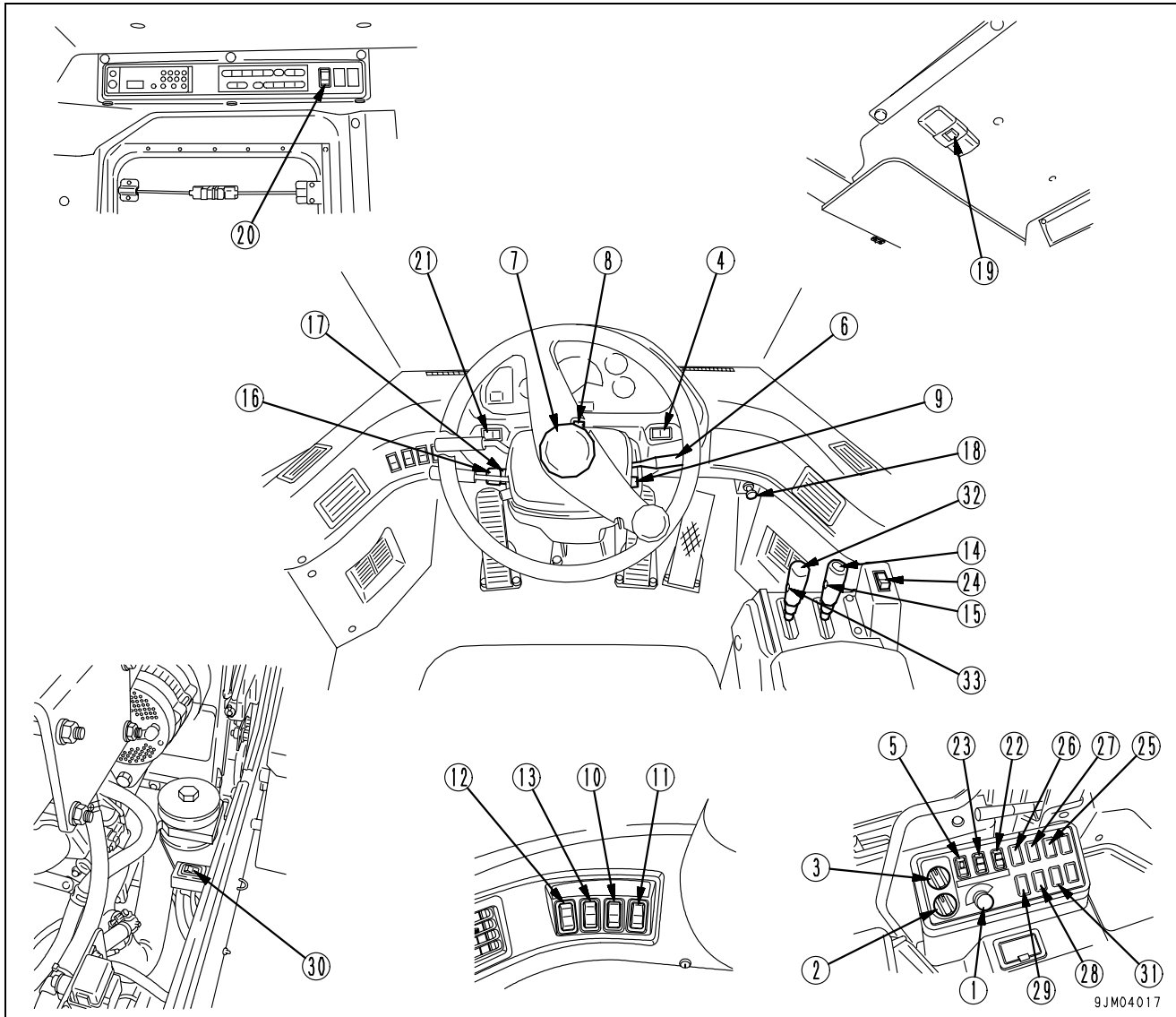
The brightness can be adjusted for the overall monitor or for the liquid crystal display only.
To adjust only the brightness of the liquid crystal display, press the (>) or (<) monitor panel mode selector switch 2 to switch the display to "LCD PANEL".



4. Press the (◇) of monitor panel mode selector switch 1. The screen will change to the display shown on the right and it will be possible to adjust the brightness.
5. Press the (>) or (<) of monitor panel mode selector switch 2 to select a level between L and H (available range: 7 stages).
6. After selecting the brightness, press the (■) of monitor panel mode selector switch 1. The brightness will be selected and the screen will return to the previous screen.
7. When completing the operation, press (■) of monitor panel mode selector switch 2 twice or turn the starting switch OFF.



SWITCHES



(1) Starting switch	(17) Rear wiper switch
(2) Power mode selector switch	(18) Cigarette lighter
(3) Transmission shift mode selector switch	(19) Room lamp switch
(4) Transmission cut-off switch	(20) Rear heated wire glass switch
(5) Transmission cut-off set switch	(21) E.C.S.S. switch
(6) Lamp switch (6) Turn signal lever (6) Dimmer switch	(22) Emergency steering switch
(7) Horn switch	(23) Cooling fan reverse rotation switch
(8) Hazard lamp switch	(24) Directional selector switch (option)
(9) Parking brake switch	(25) Directional selector actuation switch (option)
(10) Front working lamp switch	(26) Semi auto digging switch (option)
(11) Rear working lamp switch	(27) Remote positioner raise mode switch (option)
(12) Monitor panel mode selector switch 1	(28) Remote positioner lowest mode switch (option)
(13) Monitor panel mode selector switch 2	(29) Remote positioner raise/lower set switch (option)
(14) Kickdown switch	(30) Aftercooler tilt switch (option)
(15) Hold switch	(31) Torque converter lock-up switch (option)
(16) Front wiper switch	(32) Load meter cancel switch (option)
	(33) Load meter subtotal switch (option)

STARTING SWITCH

This switch(1) is used to start or stop the engine.

OFF position

It is possible to insert and remove the starting switch key, all the electric system switches are turned off, and the engine stops. In addition, the parking brake is automatically applied.

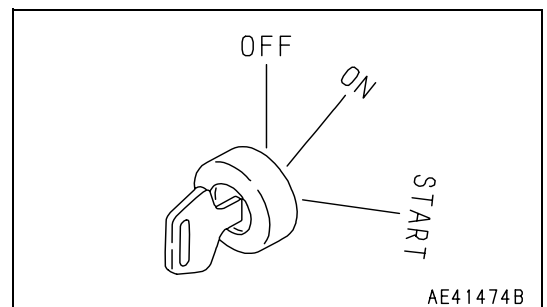
ON position

Electric current flows in the charging circuit, lamp circuit, and accessory circuit.

Keep the starting switch key at the ON position while the engine is running.

START position

This is the position to start the engine. Hold the key at this position while cranking. Release the key immediately after the engine has been started. The key will return to the ON position when released.



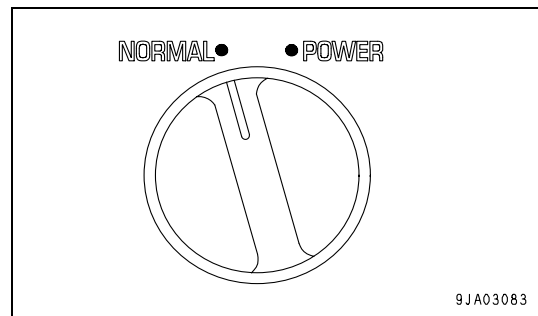
POWER MODE SELECTOR SWITCH

This switch (2) can be used to switch the engine output to match the purpose of the operation.

When the POWER mode is selected, the output mode pilot lamp (POWER mode) on the machine monitor lights up.

NORMAL position: Normal mode (low engine output), operations where emphasis is on fuel consumption, such as operations on flat ground where high engine output is not needed.

POWER position: Power mode (high engine output), operations where emphasis is on production.



REMARK

- To carry out operations with effective fuel consumption, normally is set to the **NORMAL** mode.
- The maximum engine speed is set lower than in the **POWER** mode, but except for hard operations such as heavy-duty digging of rock, it can display ample power and can also display good fuel consumption. Furthermore, by the pressing the accelerator pedal likely, it is possible to reduce the fuel consumption.
- Set to the **POWER** mode when carrying out heavy-duty digging operations of rock or operations where the speed is required, or when traveling at speed under the machine's own power on flat ground or on slopes.

TRANSMISSION SHIFT MODE SELECTOR SWITCH

This switch (3) is used to change the shift point when the AUTO SHIFT/MANUAL selector switch has been switched to auto shift.

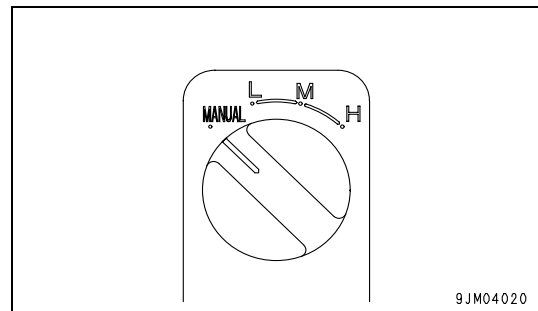
At each of the L, M, and H positions, the system switches to auto shift and the auto shift pilot lamp on the machine monitor lights up. Normally, set to auto shift.

MANUAL position: System is set to manual shift and speed range is position selected by gearshift lever

L position: Travel speed when shifting up is low (flat ground, normal travel)

M position: Travel speed when shifting up is medium (traveling uphill, traveling at high speed)

H position: Travel speed when shifting up is high (traveling uphill, traveling at high speed)



REMARK

For details of the manual shift, see "MANUAL SHIFT (3-51)".
For details of the auto-shift, see "AUTOMATIC SHIFT (3-52)".

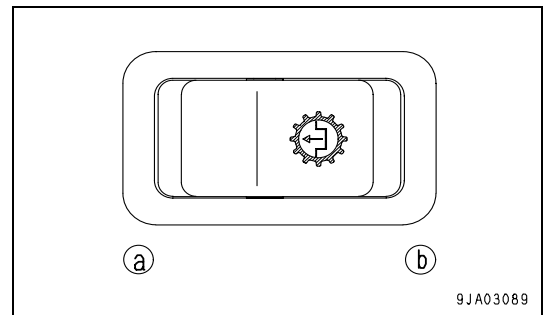
TRANSMISSION CUT-OFF SWITCH

⚠ WARNING

When moving the machine off on an uphill slope, set the transmission cut-off switch to the OFF position, depress the accelerator pedal while keeping the left brake pedal depressed, then gradually release the brake pedal and allow the machine to move. In this way the machine can be prevented from traveling backwards.

Turn this switch (4) ON and OFF.
 When the switch is pressed, the pilot lamp lights up and the system is turned ON. The transmission is shifted to neutral at the adjusted brake depression position.
 Normally, keep the switch at the ON position.

For details of the method of adjusting the cut-off position, see "ADJUSTING TRANSMISSION CUT-OFF POSITION (3-95)" in the STOPPING MACHINE section.



Position (a): OFF

The left brake pedal acts in the same way as the normal brake (right brake pedal).

Position (b): ON

The left brake pedal acts in the same way as the normal brake, and at the same time, sets the transmission to neutral.

REMARK

The brake pedal position can be adjusted when the system is actuated with the transmission cut-off set switch on the right switch panel.

TRANSMISSION CUT-OFF SET SWITCH

⚠ CAUTION

Apply the parking brake before adjusting the transmission cut-off position.

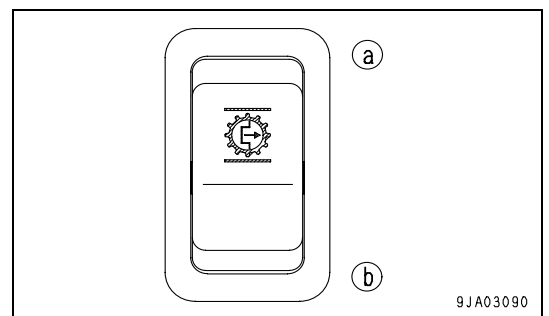
Turn this switch (5) ON and set to the transmission cut-off function to adjust the position where the brake is depressed to set the transmission to Neutral.

Position (a): ON

Cut-off position can be adjusted

When the switch is released, it automatically returns to its original position.

For details of the method of adjusting the cut-off position, see "ADJUSTING TRANSMISSION CUT-OFF POSITION (3-95)" in the STOPPING MACHINE section.



LAMP SWITCH

This switch (6) is used to light up the front lamps, side clearance lamps, tail lamps, and instrument panel.

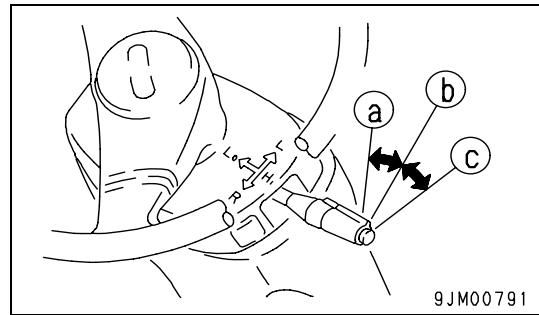
Position (a): OFF

Position (b): Side clearance lamps, tail lamps, and instrument panel light up

Position (c): Head lamps light up in addition to lamps at (b) position

REMARK

The lamp switch can be operated regardless of the position of the lever.



TURN SIGNAL LEVER

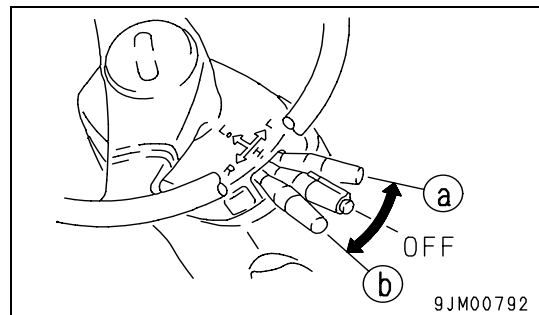
This switch (6) is used to operate the turn signal lamp.

(a) position : LEFT TURN (Push lever FORWARD.)

(b) position : RIGHT TURN (Pull lever BACK.)

REMARK

- When the lever is operated, the pilot lamp turn signal pilot lamp also flashes.
- When the steering wheel is turned back, the lever automatically returns to its original position. If it does not return, return it by hand.

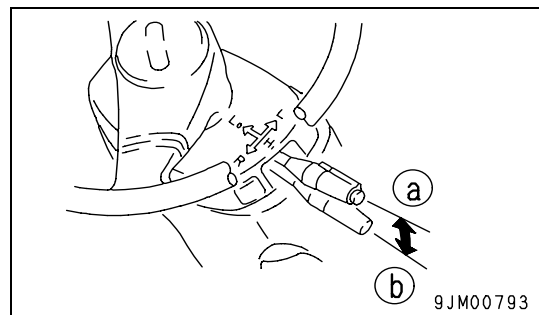


DIMMER SWITCH

This switch (6) is used to switch the head lamps between high beam and low beam.

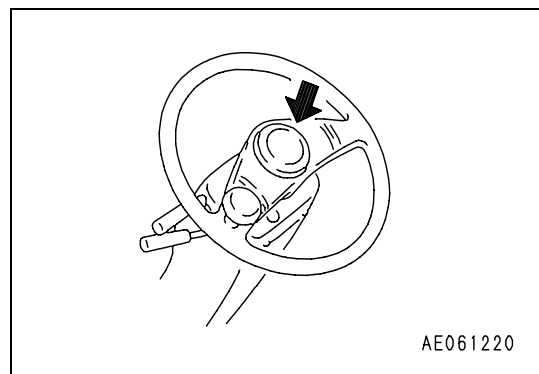
Position (a): Low beam

Position (b): High beam



HORN BUTTON

When the horn button (7) in the center of the steering wheel is pressed, the horn will sound.

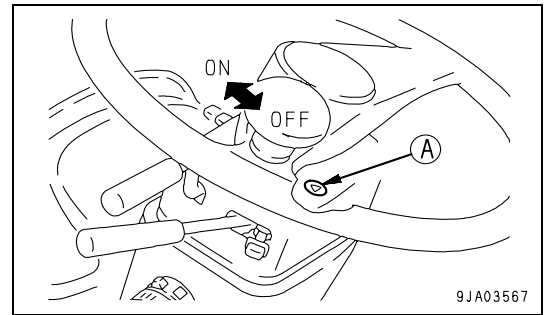


HAZARD LAMP SWITCH

! WARNING

Use the hazard lamp only in emergencies. Using the hazard lamp when traveling will cause problems for other machines.

This switch (8) is used in emergencies, such as when the machine breaks down and has to be parked on the road.
ON position: All turn signal lamps flash.

**REMARK**

When this switch is turned to the ON position, the turn direction indicator lamps and turn indicator pilot lamp flash, and display lamp (A) lights up at the same time.

PARKING BRAKE SWITCH

! WARNING

Always apply the parking brake when leaving the machine or when parking it.

Even if the parking brake switch is turned ON, there is danger until the parking brake pilot lamp lights up, so keep the brake pedal depressed.

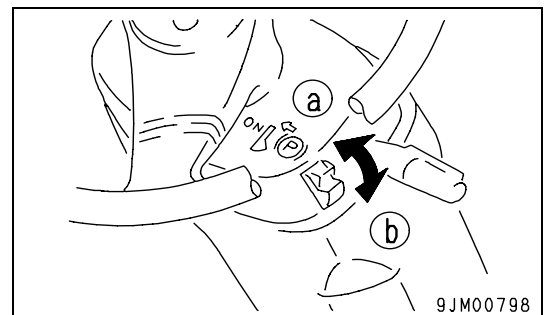
This switch (9) operates the parking brake.

Position (a): ON

The parking brake is applied, and the parking brake pilot lamp lights up.

Position (b): OFF

The parking brake is released.

**NOTICE**

- Never use the parking brake switch to apply the brakes when traveling, except in an emergency. The parking brake may be damaged and this may lead to a serious accident. Apply the parking brake only after the machine has stopped.
- If the parking brake has been used as an emergency brake when traveling at high speed, contact your Komatsu distributor to have the parking brake checked for any abnormality.

REMARK

- When the parking brake is applied, the machine will not move off even if the directional lever is operated.
- If the directional lever is placed at the F or R position with the parking brake still applied, the central warning lamp will light up and the buzzer will sound. At the same time, "E00 PARKING BRAKE" will be displayed on the character display.
- Before starting the engine, turn the parking brake switch ON, then turn it OFF again.

FRONT WORKING LAMP SWITCH

⚠ WARNING

Always turn the working lamp off before traveling on public roads.

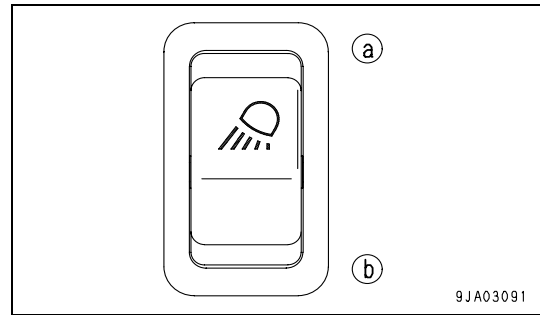
When turning the front working lamp ON, operate the lamp switch to turn the side clearance lamp ON or the head lamp ON, then operate this switch (10).

Position (a): Working lamp lights up

Position (b): Working lamp goes out

If position (a) is pressed, the pilot lamp will light up and the working lamp circuit will be switched ON.

If the lamp switch is not at the ON position for the side clearance lamp or head lamp, the working lamp will not light up.



REAR WORKING LAMP SWITCH

⚠ WARNING

Always turn the working lamp off before traveling on public roads.

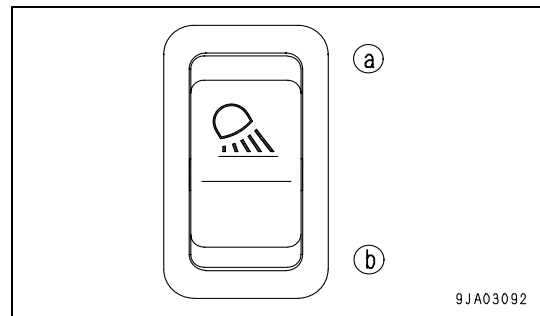
When turning the rear working lamp ON, operate the lamp switch to turn the side clearance lamp ON or the head lamp ON, then operate this switch (11).

Position (a): Working lamp lights up

Position (b): Working lamp goes out

If position (a) is pressed, the pilot lamp will light up and the working lamp circuit will be switched ON.

If the lamp switch is not at the ON position for the side clearance lamp or head lamp, the working lamp will not light up.



MONITOR PANEL MODE SELECTOR SWITCH 1

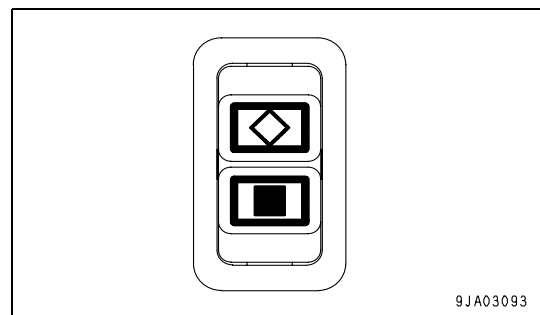
This switch (12) is used to switch the function of the character display.

When the switch is released, it automatically returns to its original position.

The basic operation is as follows.

Position (◇): Press here to select (confirm) each mode or operation

Position (■): Press here to cancel each mode or operation



MONITOR PANEL MODE SELECTOR SWITCH 2

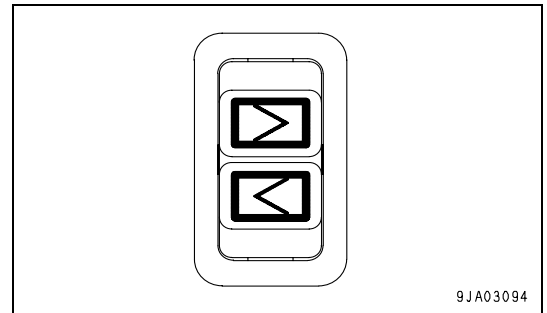
This switch (13) is used to switch the function of the character display.

When the switch is released, it automatically returns to its original position.

The basic operation is as follows.

Position (>): Press here to go on to the next screen, or to move the cursor forward, or to increase the number when inputting numerals

Position (<): Press here to go back to the previous screen, or to move the cursor back, or to reduce the number when inputting numerals



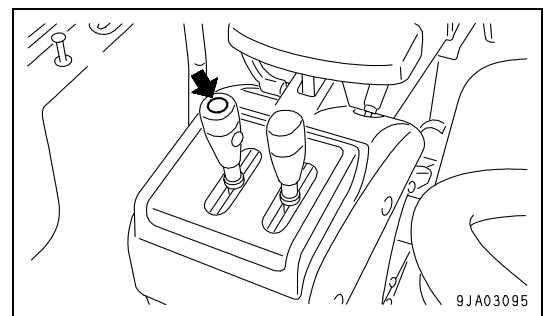
9JA03094

KICKDOWN SWITCH

When the gearshift lever is in 2nd, if switch (14) on the head of the left arm control lever is pressed, the transmission will shift down to 1st.

Use this when you need to increase the drawbar pull in digging operations.

If the transmission is in auto-shift, and the travel speed is below 12.5 km/h (7.8 MPH) in any speed range when traveling in either forward or in reverse, the kick-down switch is actuated and it is possible to shift down to 1st.



9JA03095

This makes it easy to carry out load and carry operations.

Even if the travel speed is more than 12.5 km/h (7.8MPH), this switch can be used to shift the transmission down. Each time the kick-down switch is pressed, the speed range will shift down one range at a time (F4 -> F3 -> F2). When the torque converter is in the lock-up condition (if equipped), the lock-up is canceled.

REMARK

- When canceling the kick-down, operate the directional lever. In manual shift, the kick-down can be canceled by operating the gearshift lever to any position other than 2nd. It is also possible to cancel the kick-down by turning the starting switch OFF.
- In auto-shift, if the travel speed becomes high after the kick-down, the gear will be shifted up by the auto-shift.
- In auto-shift, when traveling at more than 25 km/h (15.5 MPH) in 3rd or at more than 35 km/h (21.7 MPH) in 4th, even if the kick-down switch is pressed, the transmission will not shift down. This is to prevent overrun of the engine.

HOLD SWITCH

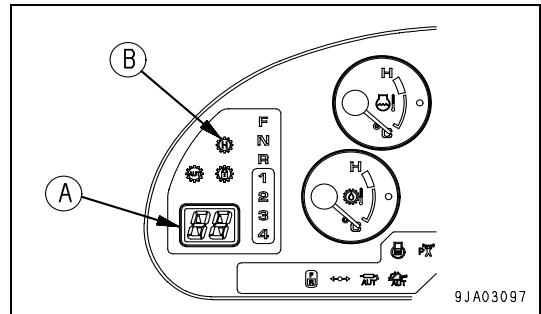
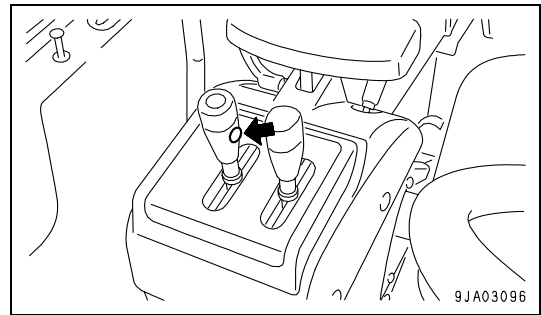
To fix the speed range when traveling in automatic transmission, press switch (15) at the side of the left arm control lever knob. The transmission will be fixed in the speed range displayed on shift indicator (A) on the machine monitor and shift hold pilot lamp (B) will light up.

When the switch is pressed again, the display goes out.

Use this function to select the desired speed range when traveling up or down hills or when carrying out operations such as grading.

REMARK

- When the torque converter is in the lock-up condition (if equipped), the transmission cannot be fixed.
- When canceling the shift hold, operate the directional lever or gearshift lever or operate the AUTO SHIFT/MANUAL selector switch to MANUAL. It is also possible to cancel the hold shift by turning the starting switch OFF.

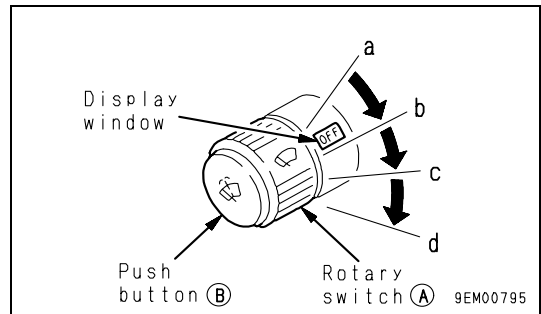


FRONT WIPER SWITCH

When rotary switch (A) of this switch (16) is turned, the front wiper will move.

If push button (B) is pressed, washer liquid will be sprayed out onto the front glass while the button is being pressed.

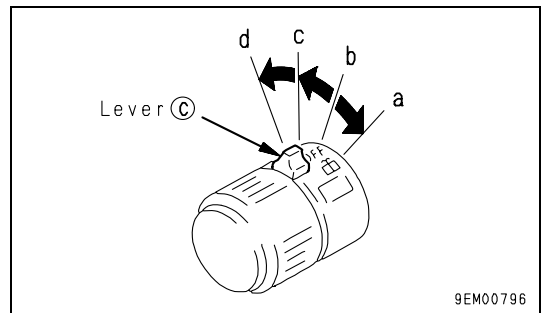
- Position(a): (OFF) stop
- Position(b): (INT)Intermittent wiper
- Position(c): Low-wspeed wiper
- Position(d): High-speed wiper



REAR WIPER SWITCH

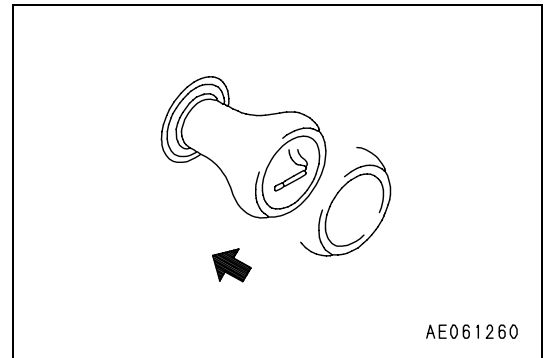
When lever (c) of this switch (17) is turned, the rear wiper will move.

- Position (a): Washer liquid is sprayed out
- Position (b): OFF
- Position (c): Wiper is operated
- Position (d): Washer liquid is sprayed out, wiper is operated



CIGARETTE LIGHTER

This is used to light cigarettes.
 After cigarette lighter (18) is pushed in, it will return to its original position after a few seconds, so pull it out and light your cigarette.

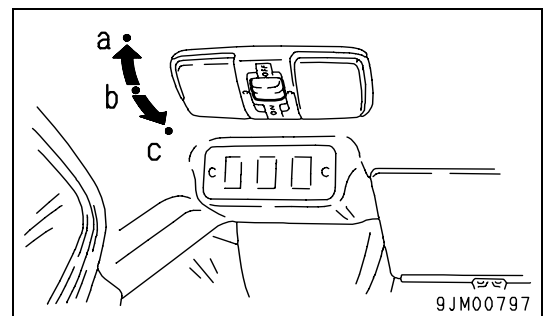


ROOM LAMP SWITCH

The switch (19) is used to turn the room lamp ON and OFF.
 Position (a): OFF
 Position (b): Lights up when the cab door opens
 Position (c): Lights up

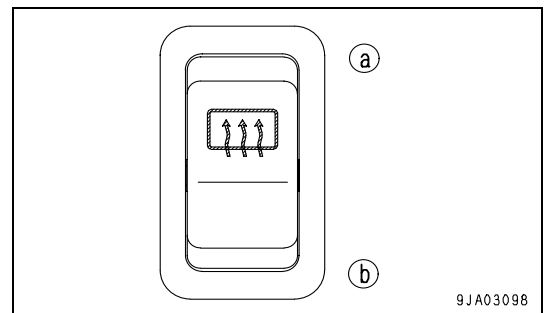
REMARK

- The room lamp lights up even when the main switch is OFF, so when leaving the operator's compartment, turn the switch to position (a) (OFF) or (b).
- When operating with the cab door fully open, set the switch to position (a) (OFF).



REAR HEATED WIRE GLASS SWITCH

When this switch (20) is pressed, electric current flows through the heated wire glass at the rear and the mist is removed from the glass.
 Position (a): ON (removes mist from glass)
 Position (b): OFF



E.C.S.S. SWITCH

 **WARNING**

- If the machine is traveling or the work equipment is raised, the moment the E.C.S.S. switch is turned ON, the work equipment will move.
- If operations are carried out with the E.C.S.S. switch at the ON position, the moment the E.C.S.S. switch is operated, the work equipment may move.
- Never turn on the E.C.S.S. switch ON during inspection or maintenance. The work equipment will move and this will create a dangerous situation.

NOTICE

- Always stop the machine and lower the work equipment to the ground before operating the E.C.S.S. switch.
- When carrying out inspection and maintenance, first lower the work equipment to the ground, then turn the E.C.S.S. switch OFF before starting the inspection and maintenance operation.
- When carrying out leveling work, turn the E.C.S.S. switch OFF.

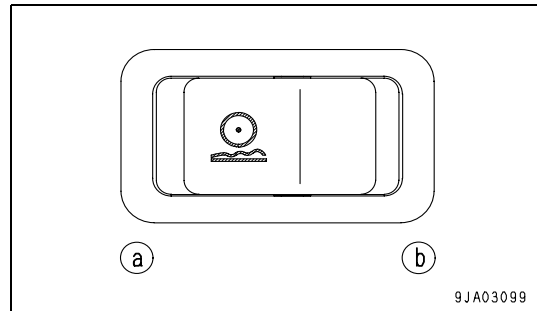
This switch (21) is used to turn the E.C.S.S. ON and OFF.

Position (a): ON

The pilot lamp lights up and the E.C.S.S. is actuated.

Position (b): OFF

The E.C.S.S. is not actuated.



REMARK

- The E.C.S.S. is a device that uses the hydraulic spring effect of an accumulator to absorb the vibration of the chassis during travel and allows the machine to travel smoothly and at high speed.
- When traveling in 1st, the E.C.S.S. is not actuated.
- When the speed range is 2nd to 4th, and the travel speed becomes more than 5 km/h (3.1 MPH), the E.C.S.S. is automatically actuated; when the travel speed goes below 3 km/h (1.9 MPH), it is automatically disengaged.

EMERGENCY STEERING SWITCH

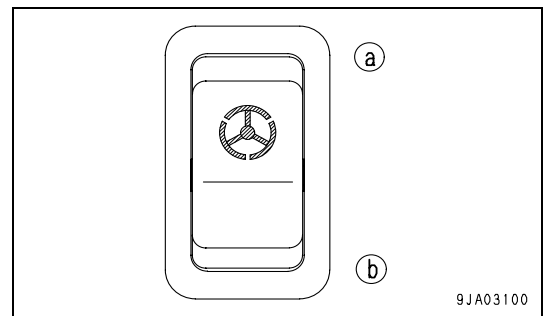
This switch (22) is the manual control switch for the emergency steering.

Even when the engine has stopped, steering operations are made possible by pressing this switch.

Position (a): ON

The pilot lamp inside the switch and the emergency steering pilot lamp on the machine monitor light up and it becomes possible to operate the steering.

When the switch is released, it automatically returns to its original position.



Actuate the emergency steering only in cases of emergency or when checking the function.

The time for operating the emergency steering continuously is a maximum of 60 seconds.

When using the emergency steering, travel at a speed of less than 5 km/h (3.1 MPH).

For details, see "EMERGENCY STEERING (3-96)" in the OPERATION section.

COOLING FAN REVERSE ROTATION SWITCH

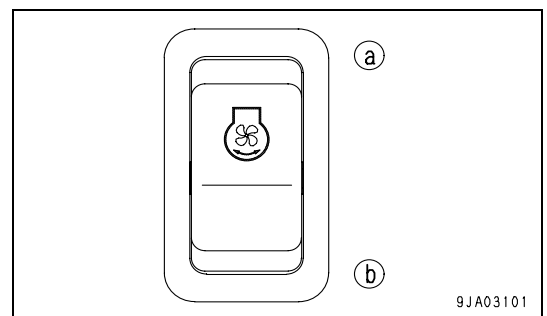
This switch (23) is used to rotate the cooling fan in the reverse direction when cleaning the radiator.

Position (a): ON

The pilot lamp inside the switch and the cooling fan reverse rotation pilot lamp on the machine monitor light up. At the same time, "COOLING FAN REVERSE" is displayed on the character display, and the fan is set to rotate in reverse.

Position (b): OFF

The cooling fan is set to rotate in the normal direction.



Stop the engine before operating the switch.

Switching normal rotation -> reverse rotation: With the engine stopped, do as follows: Starting switch ON-> reverse rotation switch ON -> check machine monitor -> starting switch START -> fan reverse rotation

Switching reverse rotation -> normal rotation: Engine at low speed -> starting switch OFF -> starting switch ON-> reverse rotation switch OFF -> starting switch START -> fan normal rotation

For details, see "CLEAN FINS BY ROTATING COOLING FAN IN REVERSE (4-28)" in the WHEN REQUIRED section.

REMARK

- When the engine is running, even if the switch is pressed, the direction of rotation of the fan does not change, but the cooling fan reverse rotation pilot lamp on the machine monitor flashes.
- Use the reverse rotation of the fan only for cleaning. For normal operations, rotate the fan in the normal direction. If operations are carried out with the fan rotating in the reverse direction, the machine will not display its full function and will tend to overheat.

DIRECTIONAL SELECTOR SWITCH

(If equipped)

This switch (24) is used to switch the direction of travel of the machine between forward and reverse.

F Position: FORWARD

N Position: Neutral

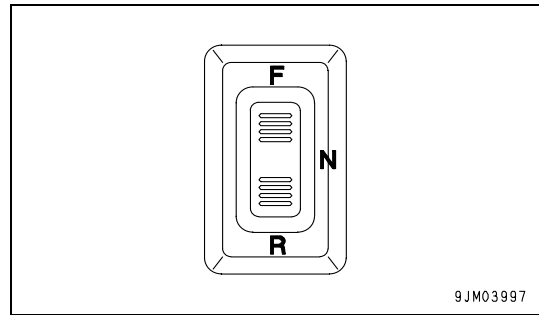
R Position: REVERSE

Before operating this switch, check that the condition is as follows.

- Directional lever is at N
- Directional selector switch actuation switch is at ON

If the condition is not as above, the switch will not work.

For details, see "CHANGING DIRECTION (3-91)".



9JM03997

DIRECTIONAL SELECTOR SWITCH ACTUATION SWITCH

(If equipped)

When this switch (25) is turned on, the directional selector switch on the side of the lift arm control lever is actuated.

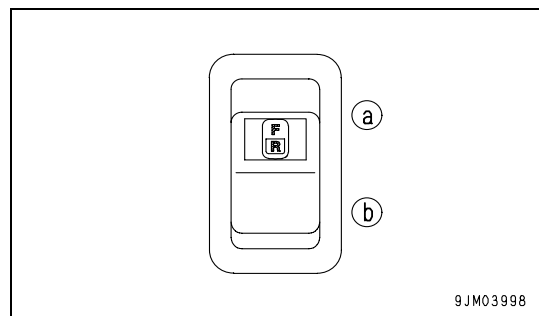
Position (a): ON

The directional selector switch is actuated.

The directional selector pilot lamp on the machine monitor lights up.

Position (b): OFF

The directional selector switch is turned off.



9JM03998

SEMI AUTO DIGGING SWITCH

(If equipped)

This switch (26) turns the semi auto digging ON or OFF.

Position (a): HARD mode

The bucket tilt actuation is controlled intermittently.

Use this mode when handling heavy load materials.

Position (b): SOFT mode

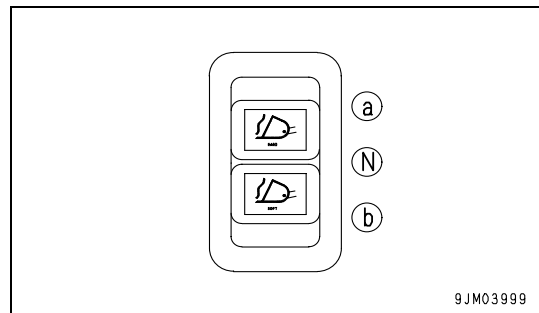
The bucket tilt actuation is controlled continuously.

Use this mode when handling crushed rock or other light load materials.

N position: Semi auto digging is switched OFF

In positions (a) and (b), the pilot lamp inside the switch lights up.

For details, see "SEMI AUTO DIGGING OPERATIONS (3-103)".



9JM03999

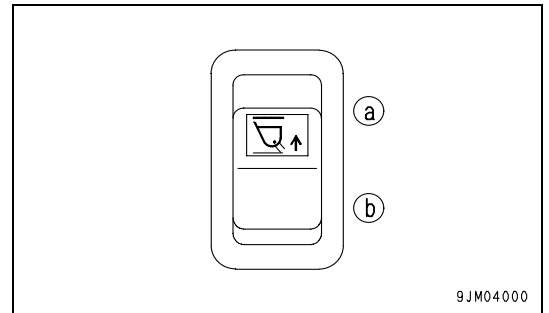
REMOTE POSITIONER RAISE MODE SWITCH

(If equipped)

Use this switch (27) to turn on the remote positioner RAISE mode (operating the lift arm at above the horizontal position).

Position (a): RAISE mode ON

Position (b): OFF



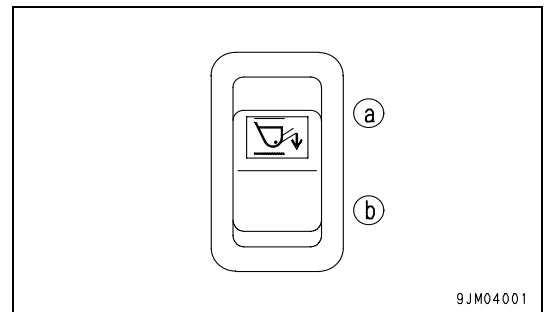
REMOTE POSITIONER LOWER MODE SWITCH

(If equipped)

Use this switch (28) to turn on the remote positioner LOWER mode (operating the lift arm at below the horizontal position).

Position (a): LOWER mode ON

Position (b): OFF



REMOTE POSITIONER RAISE/LOWER SET SWITCH

(If equipped)

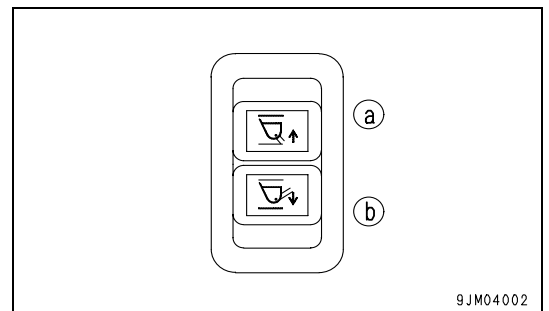
Use this switch (29) to set the stopping position of the lift arm for the remote positioner.

Position (a): After turning the remote positioner RAISE mode switch ON, raise the lift arm to the desired position above horizontal, then press the bottom (a) of this switch to set the top lift arm stop position at that point.

Position (b): After turning the remote positioner LOWER mode switch ON, lower the lift arm to the desired position below horizontal, then press the bottom (b) of this switch to set the bottom lift arm stop position at that point.

If the setting is carried out properly, the buzzer will give short sounds.

If the setting cannot be carried out, the buzzer gives a long sound.



AFTERCOOLER TILT SWITCH

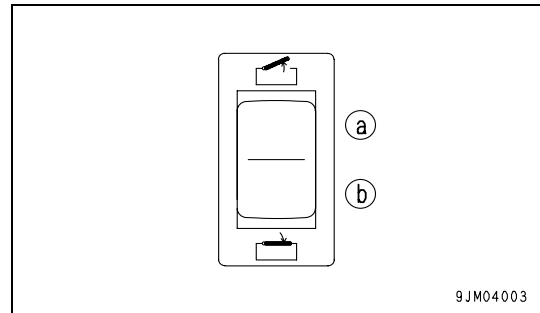
(If equipped)

This switch (30) can be used to tilt the aftercooler electrically.

Use this when cleaning the cooler fins.

Position (a): Cooler is tilted 17 degrees

Position (b): Cooler is returned to original position

**TORQUE CONVERTER LOCK-UP SWITCH**

(If equipped)

For details of the torque converter lock-up, see "HANDLING TORQUE CONVERTER LOCK-UP (6-27)" in the ATTACHMENT AND OPTION section.

LOAD METER CANCEL SWITCH

(If equipped)

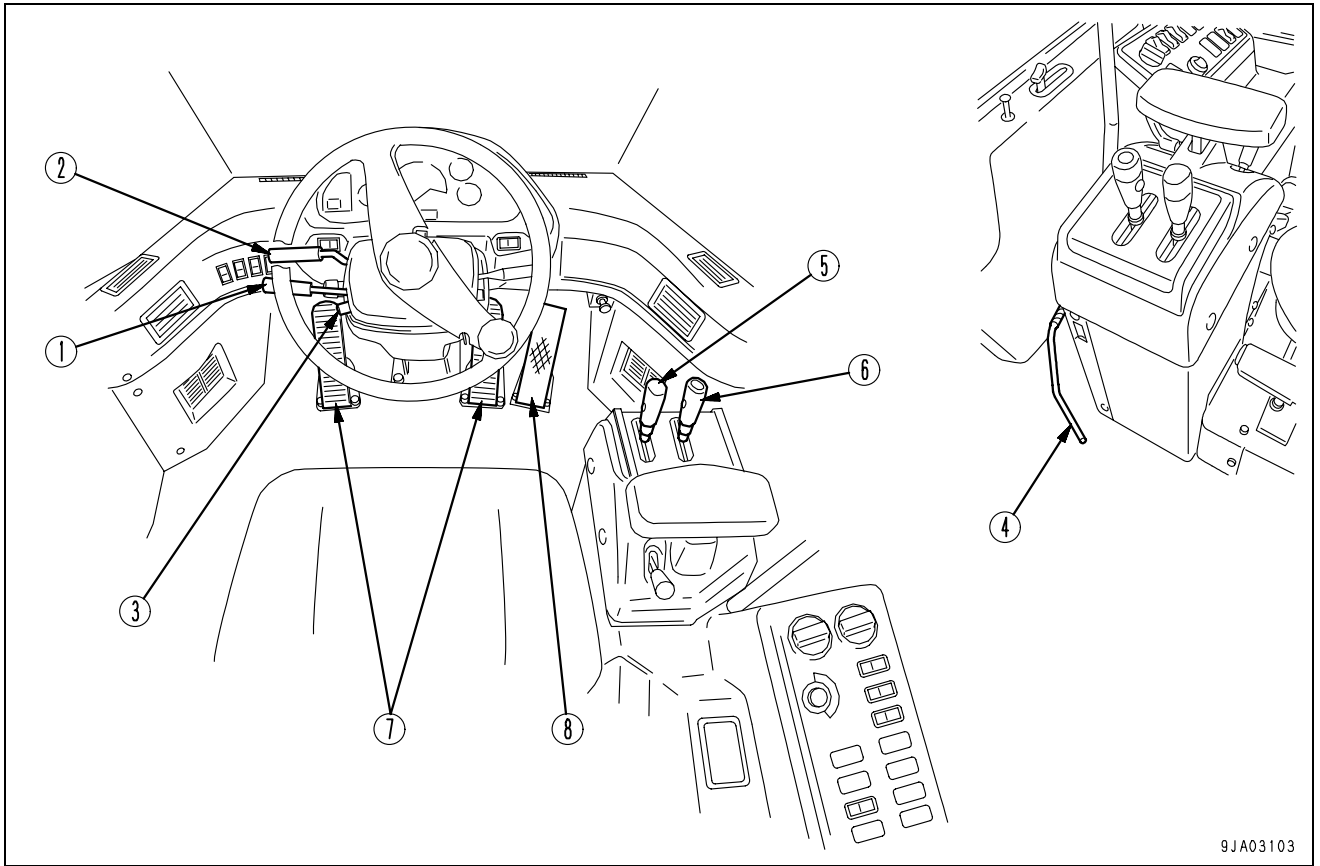
For details of the load meter, see "HANDLING LOAD METER (6-2)" in the ATTACHMENT AND OPTION section.

LOAD METER SUBTOTAL SWITCH

(If equipped)

For details of the load meter, see "HANDLING LOAD METER (6-2)" in the ATTACHMENT AND OPTION section.

CONTROL LEVERS, PEDALS



9JA03103

(1) Speed control lever	(5) Bucket control lever
(2) Directinal lever	(6) Lift arm control lever
(3) Directinal lever stopper	(7) Brake pedal
(4) Safety lock lever (for wark equipment lever)	(8) Accelelator pedal

SPEED CONTROL LEVER

This lever (1) controls the travel speed of machine.

MANUAL SHIFT

This machine has a 4-FORWARD, 4-REVERSE speed transmission.

Place the speed control lever in a suitable position to obtain the desired speed range.

1st and 2nd speeds are used for working.

3rd and 4th speeds are used for traveling.

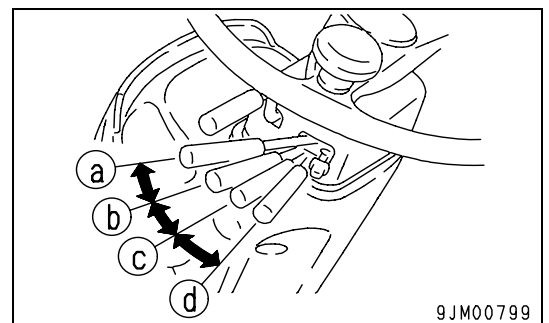
However, when the speed control lever stopper is being used, it is impossible to shift to 3rd or 4th. Disengage the speed control lever stopper before trying to shift gear.

Position (a):1st

Position (b):2nd

Position (c):3rd

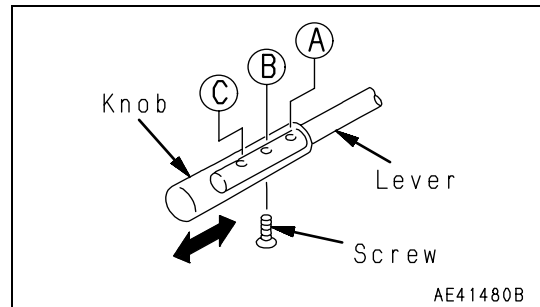
Position (d):4th



9JM00799

REMARK

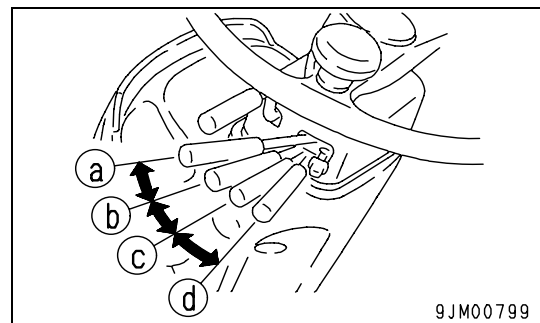
The length of the lever can be adjusted to 3 stages (positions (A), (B), (C)). To adjust the length, remove the screw at the bottom of the lever knob, slide the knob to the desired position, then tighten the screw again. (The lever is installed to position (B) when it is shipped from the factory.)



AUTOMATIC SHIFT

Automatic gear shifting can be carried out in the 2nd and 4th speed range of the four forward and reverse speeds depending on the travel conditions.

- Position (a): 1st
- Position (b): 2nd
- Position (c): 3rd
- Position (d): 4th



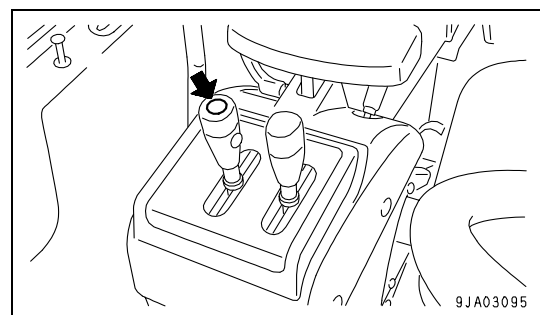
The range of speeds during automatic gear shifting is determined by the position of the gear shift lever as shown in the chart on the right.

Gear shift lever position	4		○	→	○	→	○
	3		○	→	○		
	2		○				
		1	2	3	4	Automatic speed range	

AD41887B

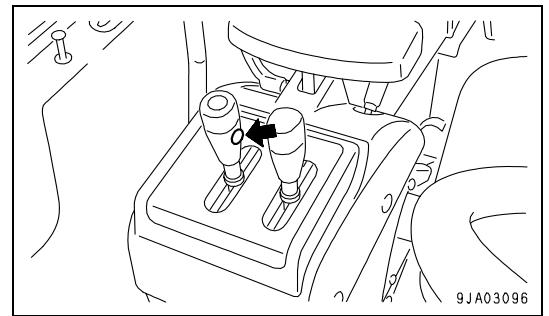
REMARK

- The 1st position for the gearshift lever fixes the transmission in 1st. There is no automatic shifting of the transmission.
- When shifting down from 2nd to 1st, press the kick-down switch on the lift arm control lever.
- If the transmission is in auto-shift and the travel speed is below 12.5 km/h (7.8 MPH) in any speed range when traveling in either forward or in reverse, the kick-down switch is actuated and makes it possible to shift down to 1st.
- This makes it easy to carry out load and carry operations.
- Even if the travel speed is more than 12.5 km/h (7.8 MPH), this switch can be used to shift the transmission down. Each time the kick-down switch is pressed, the speed range will shift down one range at a time (when in 4th: F4 -> F3 -> F2 when in 3rd: F3 -> F2).



To set to the desired speed range when traveling uphill or downhill, or when carrying out grading, do as follows.

- When fixing the speed range
Press the HOLD switch on the rift arm control lever.
The speed range is fixed at the speed range displayed on the transmission indicator on the main monitor.
- When shifting up or down from set speed range
Shift gear with the gear shift lever.



REMARK

When the transmission has been shifted down from 2nd to 1st with the kickdown switch, it will shift up from 1st to 2nd when the travel speed increases.

DIRECTIONAL LEVER

This lever (2) is used to switch the direction of travel of the machine between forward and reverse.

When starting the engine, if the directional lever is not at the N position, the engine will not start.

In this case, the central warning lamp will light up and the buzzer will sound.

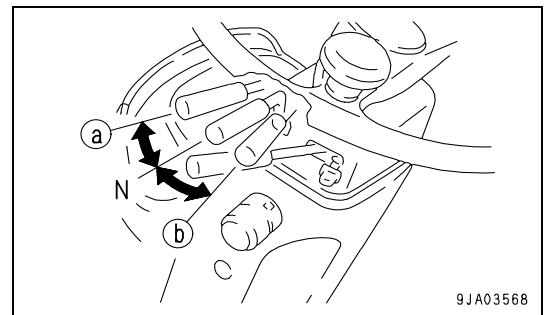
At the same time, "E00 SHIFT LEVER NEUT" is displayed on the character display.

Return the gearshift lever to the N position and start the engine.

Position (a): FORWARD

Position N: Neutral

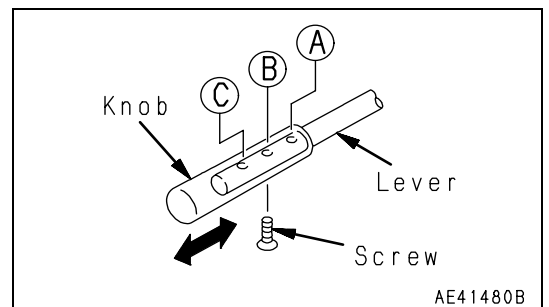
Position (b): REVERSE



REMARK

The length of the lever can be adjusted to 3 stages (positions (A), (B), (C)). To adjust the length, remove the screw at the bottom of the lever knob, slide the knob to the desired position, then tighten the screw again.

(The lever is installed to position (B) when it is shipped from the factory.)

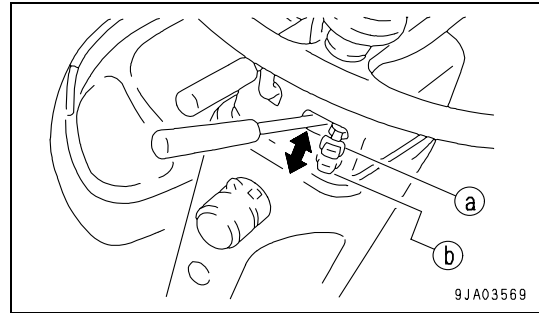


SPEED CONTROL LEVER STOPPER

This stopper (3) prevents the speed control lever from entering the 3rd positions when working.

Position (a): Stopper actuated.

Position (b): Stopper released.



SAFETY LOCK LEVER (FOR WORK EQUIPMENT LEVER)

⚠ WARNING

- Before standing up from the operator's seat, set the safety lock lever securely to the LOCK position. If the safety lock lever is not at the LOCK position, and work equipment control lever (A) is touched by mistake, it may lead to a serious accident.
- If the safety lock lever is not placed securely at the LOCK position, the work equipment may move, and this may lead to a serious accident or personal injury. Check that the lever is in the position shown in the diagram.
- When pulling up or pushing down the safety lock lever, be careful not to touch work equipment control lever (A).

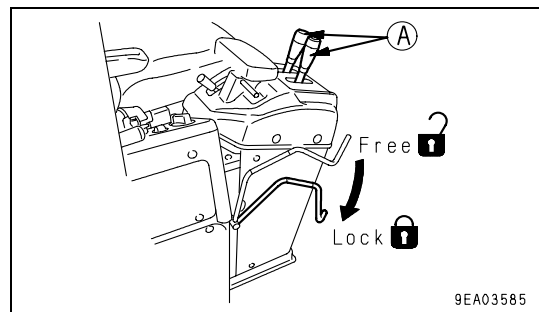
This lever (4) is a lock device for the work equipment control lever.

Push the safety lock lever down to lock it.

REMARK

This lever electrically locks the hydraulic circuit for the work equipment, so if it is at the LOCK position, the work equipment will not move even when work equipment control lever (A) is operated.

If the work equipment control lever is operated when this lever is at the LOCK position, the central warning lamp lights up and the alarm buzzer sounds. At the same time, "E00 WORK LEVER POSI" is displayed on the character display.



BUCKET CONTROL LEVER

This lever (5) operates the bucket.

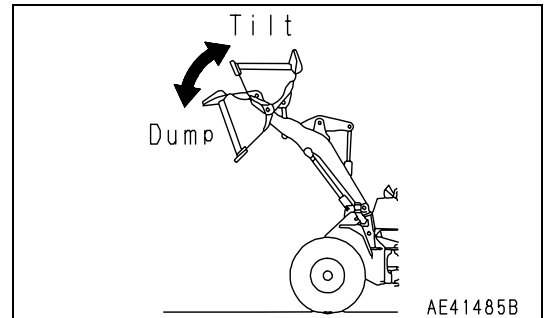
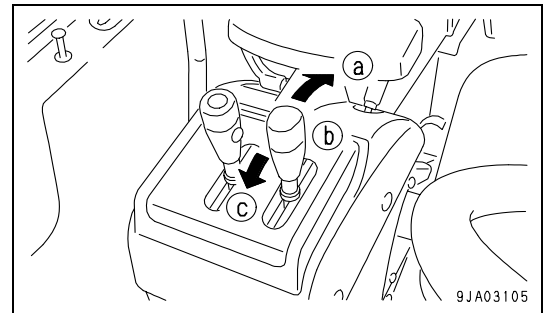
Position (a): TILT

When the bucket control lever is pulled further from the TILT position, the lever is stopped in this position until the bucket reaches the preset position of the positioner, and the lever is returned to the HOLD position.

Position (b): HOLD

The bucket is kept in the same position.

Position (c): DUMP



LIFT ARM CONTROL LEVER

This lever (6) is used to operate the lift arm.

Position (a): RAISE

When the lift arm control lever is pulled further from the RAISE position, the lever is stopped in this position until the lift arm reaches the pre-set position of the kick-out, and the lever is returned to the HOLD position.

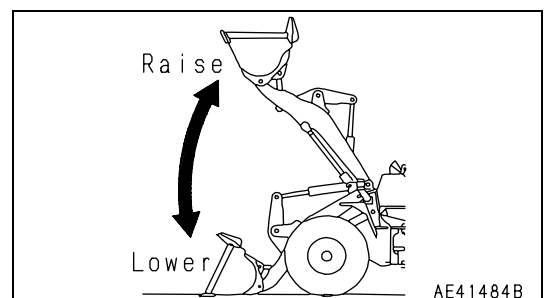
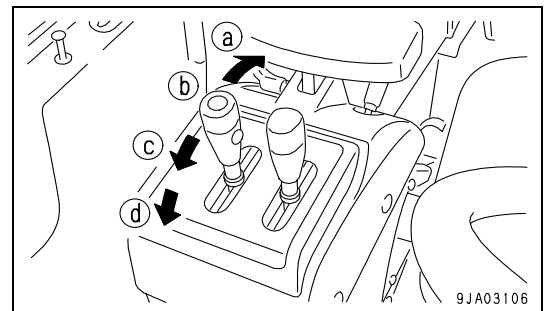
Position (b): HOLD

The lift arm is kept in the same position.

Position (c): LOWER

Position (d): FLOAT

The lift arm moves freely under external force.

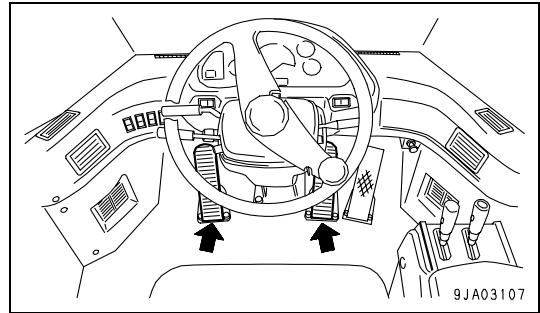


BRAKE PEDAL

WARNING

- When traveling downhill, use the engine as a brake, and always use the right brake pedal.
- Do not use the brake pedals repeatedly unless necessary.
- Do not put your foot on this pedal unless necessary.

These pedals (7) operate the brakes.



RIGHT BRAKE PEDAL

The right brake pedal operates the wheel brakes. Use the right brake pedal for normal braking operations.

LEFT BRAKE PEDAL

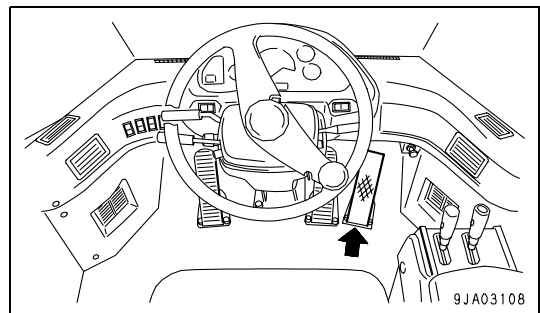
The left brake pedal operates the wheel brakes. When the transmission cut-off switch is in the ON position, and if this brake is depressed, wheel brakes are applied and the transmission is set to the neutral position at the same time. If the transmission cut-off switch is at OFF, the left brake pedal acts in the same way as the right brake pedal.

REMARK

When the accelerator is being used for operating the work equipment, always use the left brake pedal to slow or stop the machine after putting the transmission cut-off switch to the ON position.

ACCELERATOR PEDAL

This pedal (8) controls the engine speed and output. The engine speed can be freely controlled between low idling and full speed.



STEERING TILT LOCK LEVER

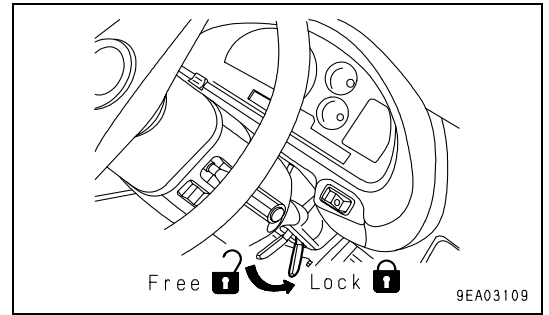
⚠ WARNING

Stop the machine before adjusting the tilt of the steering wheel. If this operation (adjustment) is carried out while the machine is moving, it may lead to a serious accident or personal injury.

This lever is used to set the steering wheel to the FREE position when adjusting the position of the steering wheel to the front or rear or up or down.

Pull the lever up, set the steering wheel to the desired position, then push the lever down to lock the steering wheel securely in position.

The amount of adjustment is as follows.



Up-down movement	When at 0 mm (0 in)	When moved up to 40 mm (1.6 in)
Tilt amount	0 - 105 mm (0 - 4.1 in)	0 - 130 mm (0 - 5.1 in)

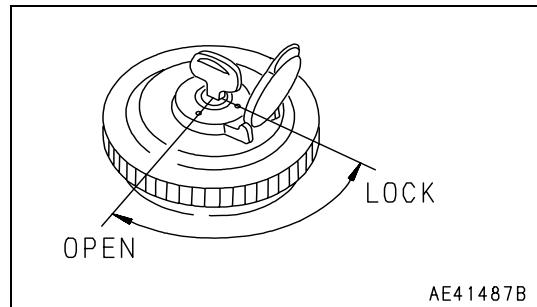
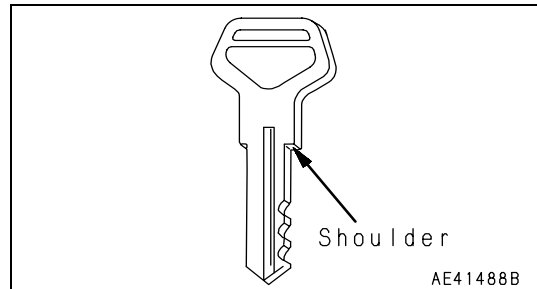
CAP WITH LOCK

The fuel tank filler port and the hydraulic tank filler port (if equipped) are equipped with locks. Use the starting switch key to open and close the cap.

METHOD OF OPENING AND CLOSING CAP WITH LOCK (FOR THE FUEL TANK FILLER PORT)

TO OPEN THE CAP

1. Insert the starting switch key into the cap as far as it will go (to the shoulder).
If the starting switch key is turned before it is inserted all the way, it may break.
2. Turn the starting switch key clockwise, align the match mark on the cap with the rotor groove, then remove the cap.



TO LOCK THE CAP

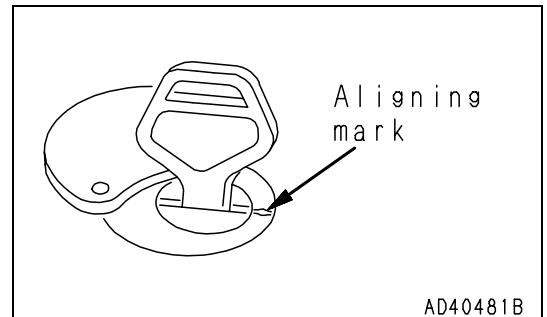
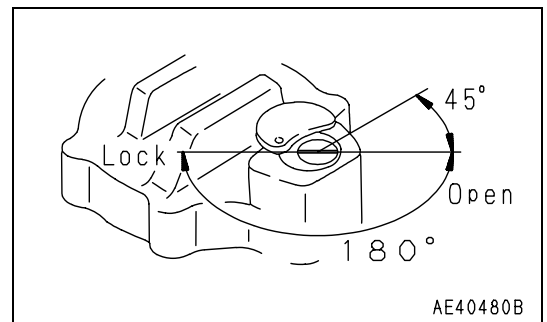
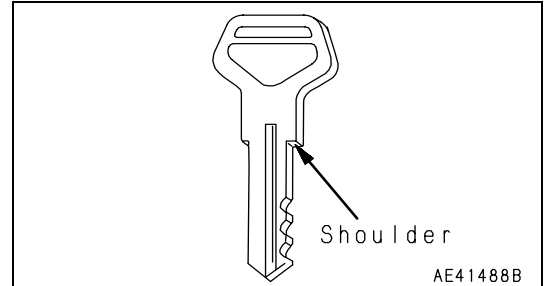
1. Screw the cap into place.
2. Turn the key counterclockwise and take the key out.

**METHOD OF OPENING AND CLOSING CAP WITH LOCK
(FOR THE HYDRAURIC TANK FILLER PORT)**

(If equipped)

TO OPEN THE CAP

1. Insert the starting switch key into the cap as far as it will go (to the shoulder).
If the starting switch key is turned before it is inserted all the way, it may break.
2. Turn the starting switch key counterclockwise and bring the rotor groove in line with the aligning mark on the cap. Turn the cap slowly until a "clicking" sound is made. This releases the lock and allows the cap to be opened.

**TO LOCK THE CAP**

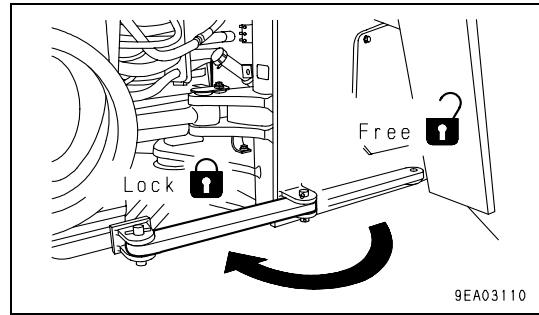
1. Screw the cap into place.
2. Turn the starting switch key counterclockwise and take the key out.

SAFETY BAR

WARNING

- When carrying out maintenance or transporting the machine, always fit the safety bar.
- Always remove the safety bar for general travel operations. If it is not removed, the steering wheel cannot be used for steering. This is extremely dangerous.

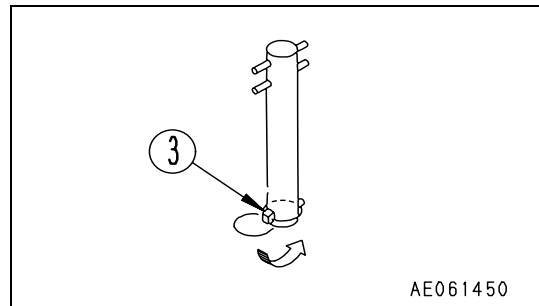
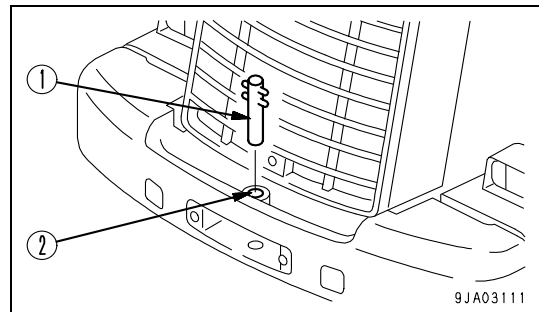
This pin (1) is used to lock the front frame and rear frame to prevent the machine from bending during maintenance or transporting the machine.



TOWING PIN

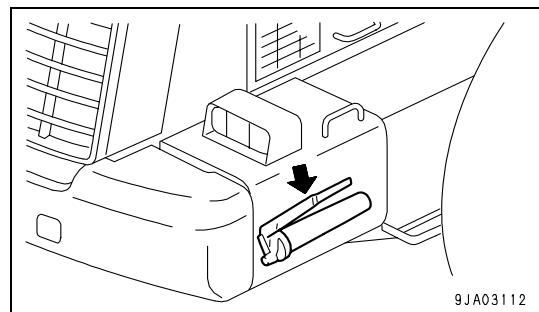
1. Insert towing pin (1) into hole (2) in the counterweight.
2. Use lynch pin (3) to set so that the towing pin does not come out.

Carry out this operation in reverse to remove the pin.



GREASE PUMP

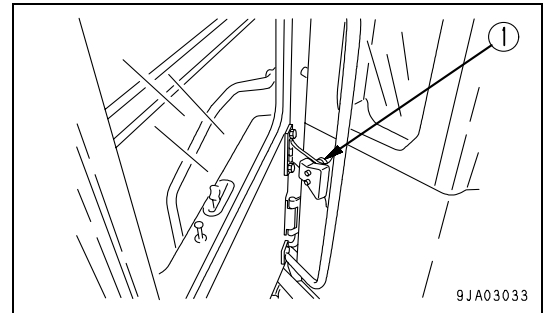
The grease pump is stored inside the battery box at the rear of the machine. After using it, wipe off all grease stuck to the outside of the pump and then store it in the box. It can be stored in either the left or right battery box.



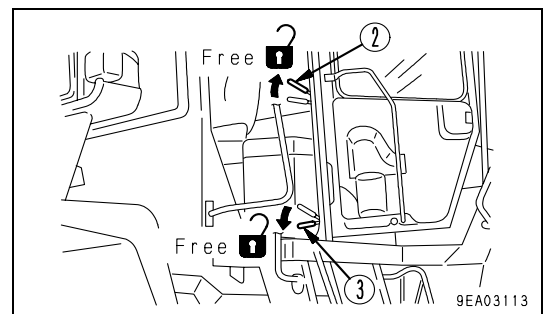
CAB DOOR OPEN LOCK

When getting in or out of the operator's compartment, or when operating with the door open, use this lock to hold the door in position.

1. Push the door against catch (1) to fix it in position.
2. When fixing the door in position, fix it firmly to the catch.
3. When getting on or off the machine, hold the handrail on the inside.



4. When closing the door from the operator's seat, push lever (2) up to release the catcher.
5. When closing the door after getting off the machine, push lever (3) down to release the catcher.

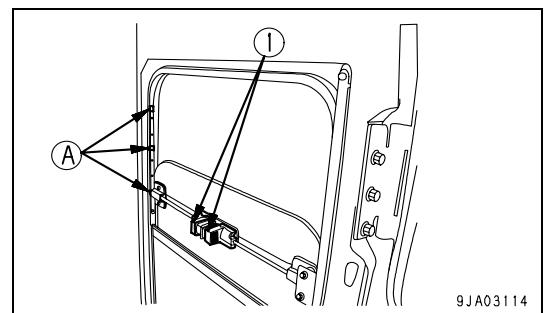


CAB WINDOW OPEN LOCK CANCEL KNOB

Use this knob when you want to move the door window glass up or down to open or close it.

Grip lock cancel knob (1) to release the lock, and move it down to a lower lock position. Release lock cancel knob (1).

There are 3 points for lock position (A).



BACKUP ALARM

This sounds an alarm when the directional lever is set to the R position. It is used to warn people behind the machine that the machine will travel in reverse.

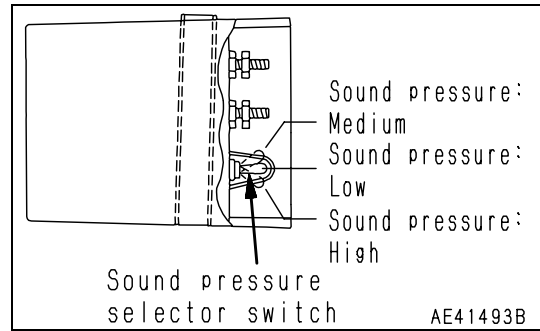
If the alarm cannot be heard clearly or is too loud, adjust the volume as follows.

REMARK

The alarm is set to the highest level when the machine is shipped from the factory.

METHOD OF CHANGING

Operate the sound pressure selector switch at the rear face of the backup alarm to adjust the volume.

**FUSE****NOTICE**

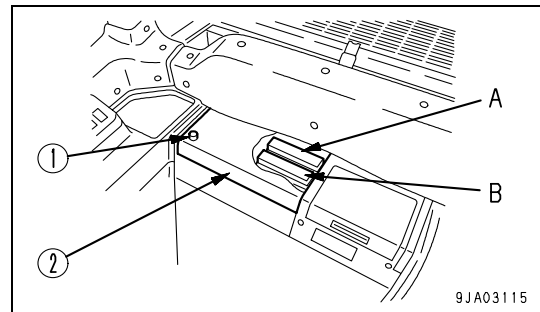
Before replacing a fuse, be sure to turn off the starting switch.

The fuses protect the electrical equipment and wiring from burning out.

If the fuse becomes corroded, or white powder can be seen, or the fuse is loose in the fuse holder, replace the fuse.

Replace the fuse with another of the same capacity.

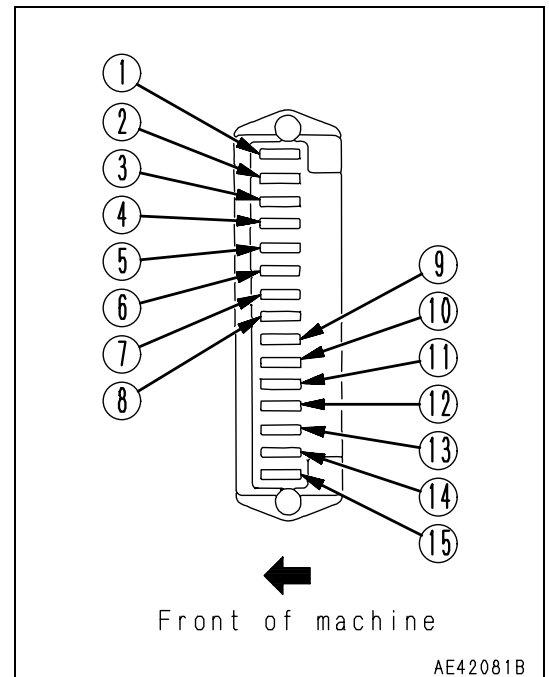
Loosen knob (1) at two places, then remove cover (2). The fuse boxes are A and B.



FUSE CAPACITY AND NAME OF CIRCUIT

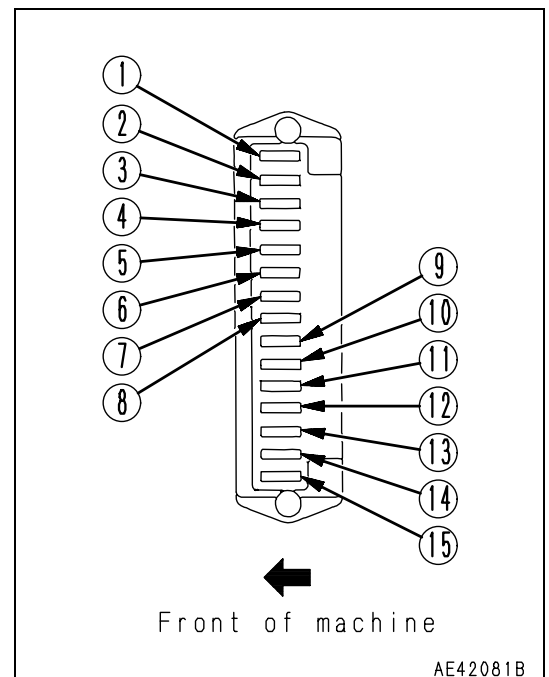
FUSE BOX A

No.	Fuse capacity	Name of circuit
(1)	10A	Horn, air suspension
(2)	20A	Transmission control
(3)	10A	Parking brake
(4)	10A	Emergency steering
(5)	20A	Work equipment positioner
(6)	20A	Rear heated wire glass
(7)	20A	Wiper, washer
(8)	10A	Rotating lamp (if equipped)
(9)	10A	(KOMTRAX)
(10)	10A	Backup lamp, brake lamp
(11)	20A	Main lamp circuit
(12)	10A	Right side clearance lamp
(13)	10A	Left side clearance lamp
(14)	10A	Right head lamp
(15)	10A	Left head lamp



FUSE BOX B

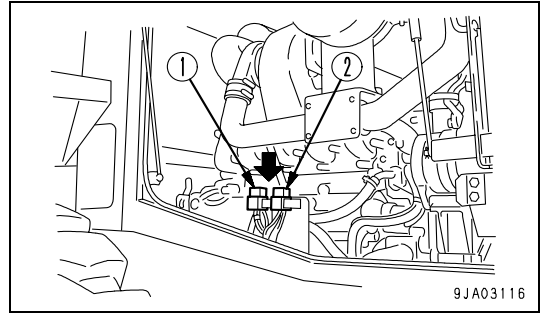
No.	Fuse capacity	Name of circuit
(1)	20A	Starting switch
(2)	10A	Hazard lamp
(3)	10A	Instrument panel A
(4)	10A	Room lamp
(5)	10A	Spare 1
(6)	20A	Engine controller
(7)	10A	Turn signal indicator
(8)	20A	Front working lamp
(9)	20A	Rear working lamp
(10)	10A	Instrument panel B
(11)	10A	Car radio
(12)	10A	Spare 2
(13)	10A	DC-DC converter
(14)	20A	Air conditioner A
(15)	20A	Air conditioner B



SLOW-BLOW FUSE

If the power does not come on when the starting switch is turned ON, the slow-blow fuse may be blown, so check and replace it.

The slow-blow fuse is beside the engine on the left side of the machine.



SLOW-BLOW FUSE

(1)120A: Heater relay (electrical intake air heater)

120A: Main power

(2)30A: Battery power (starting switch, hazard)

TAKING OFF POWER

NOTICE

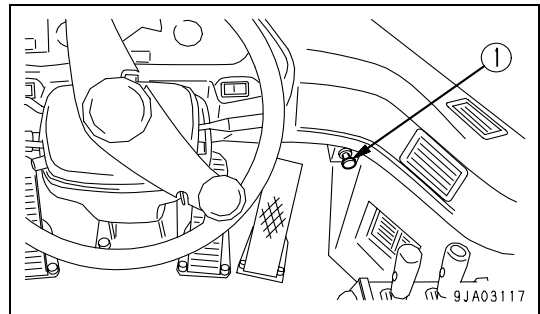
- There are two power sources: 12V and 24V

Check the voltage of the electrical equipment and select the appropriate power source.

- Mistaken use, such as using 24V as the power source for 12V equipment, will cause failure of the equipment.
- When using the electric power source, do not install any equipment which will exceed the maximum amperage.

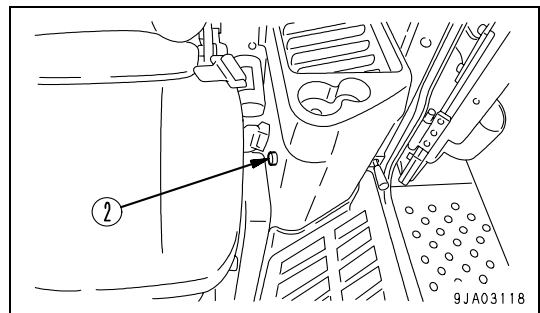
When cigarette lighter (1) is removed, the lighter socket can be used as a 24V power source.

Maximum amperage: 9A (216W)



Electric power source (2) can be used as a 12V power source.

Maximum amperage: 10A (120W)



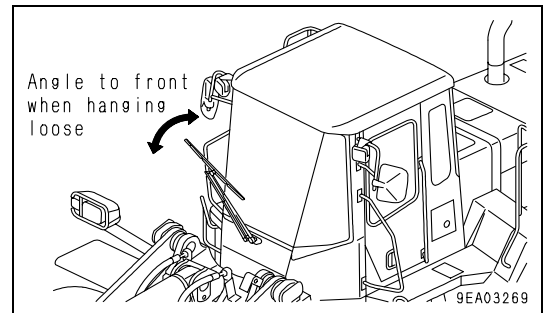
HANDLING CAB WIPER

PREVENTING DAMAGE TO WIPER ARM BRACKET

NOTICE

When angling the wiper arm to the front, check that the wiper blade is hanging free.

When angling the wiper arm to the front, such as when wiping the glass clean, if the wiper arm is angled with the wiper blade locked to the arm (the bottom of the blade is caught on the arm), abnormal force is brought to bear on the mounting bracket and the bracket may break.



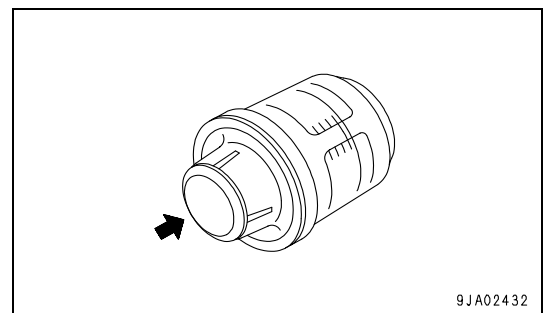
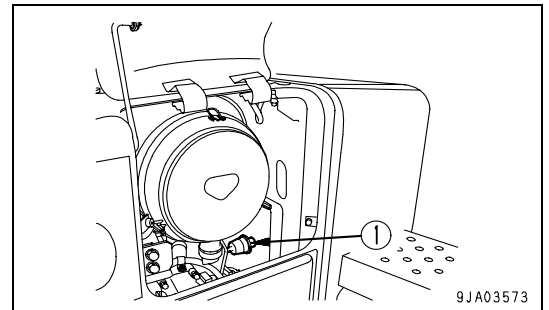
DUST INDICATOR

Open the top front cover of the engine side cover at the right side of the machine. The dust indicator is under the air cleaner. The display is given in five stages according to the degree of clogging of the element.

The air cleaner clogging caution lamp on the machine monitor lights up when the air cleaner is clogged to inform the operator that the air cleaner should be cleaned.

After cleaning, press the reset button to cancel the display.

For details of the method of cleaning, see "CLEANING OR REPLACING OUTER ELEMENT (4-19)".



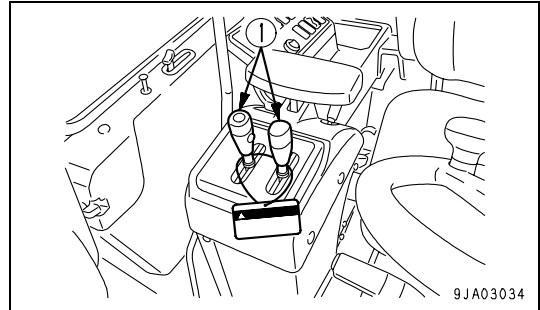
OPERATION

CHECK BEFORE STARTING ENGINE, ADJUST

WALK-AROUND CHECK

WARNING

- Always attach the warning tag to work equipment control lever (1).
- Leakage of oil or fuel, or accumulation of flammable material around high temperature parts, such as the engine muffler or turbocharger, may cause fire. Check carefully, and if any abnormality is found, repair it or contact your Komatsu distributor.



Before starting the engine, walk around the machine and look to the underside of chassis for anything unusual like looseness of the bolts and nuts, leakage of fuel, oil and cooling water. Also check the condition of the work equipment and the hydraulic system.

Do not neglect the electric wiring then to see that there is no looseness, play or dust on the portion that generates high temperature.

Always carry out the items in this section before starting the engine each day.

1. Check for damage, wear, play in work equipment, cylinders, linkage, hoses
Check that there are no cracks, excessive wear, or play in the work equipment, cylinders, linkage, or hoses. If any abnormality is found, repair it.
2. Remove dirt and dust from around engine, battery, radiator

Check if there is any dirt or dust accumulated around the engine or radiator. Check also if there is any flammable material (dead leaves, twigs, etc.) accumulated around the battery or high temperature engine parts, such as the engine muffler or turbocharger. Remove all such dirt or flammable material.
3. Check for leakage of water or oil around engine

Check that there is no leakage of oil from the engine or leakage of water from the cooling system. If any abnormality is found, repair it.
4. Check for leakage of oil from transmission case, axle, hydraulic tank, hoses, joints

Check that there is no leakage of oil. If any abnormality is found, repair the location of the leakage.
5. Check for leakage of oil from brake line

Check that there is no leakage of oil. If any abnormality is found, repair the location of the leakage.
6. Check for damage or wear to tires, loose mounting bolts
Check for cracks or peeling of the tires and for cracks or wear to the wheels (side rim, rim base, lock ring). Tighten any loose wheel nuts. If any abnormality is found, repair or replace the part.
If any valve caps are missing, install new caps.

- 7. Check for damage to handrail and steps, loose bolts

Repair any damage and tighten any loose bolts.

- 8. Check for damage to gauges, lamps on instrument panel, loose bolts

Check for damage to the panel, gauges and lamps. If any abnormality is found, replace the parts. Clean off any dirt on the surface.

- 9. Check for loose air cleaner mounting bolts

Check for the loose bolts, and if loose, tighten up.

- 10. Check for loose battery terminals

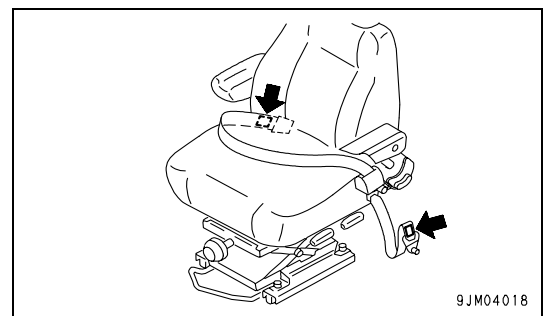
Tighten any loose terminal.

- 11. Check for damage to seat belt and mounting clamps

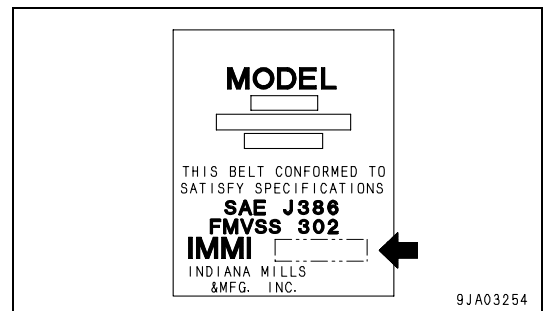
Check that there are no loose bolts on the equipment mounting the seat belt to the machine, and tighten if necessary.

Tightening torque: $24.5 \pm 4.9 \text{ N}^2\text{m}$ ($2.5 \pm 0.5 \text{ kgf}^2\text{m}$, $18.1 \pm 3.6 \text{ lbft}$)

If the belt is damaged or fluff is starting to form, or if there is any damage or deformation of the seat belt holders, replace the seat belt with a new part.



9JM04018



9JA03254

- 12. Clean cab window

Clean the cab window to ensure good visibility when operating the machine.

13. Inspection of tires

⚠ WARNING

If worn or damaged tires are used, they may burst and cause serious injury or death.

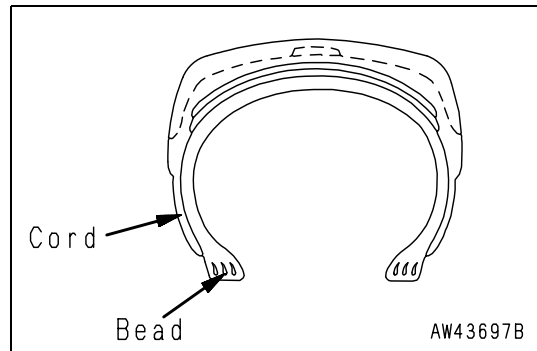
To ensure safety, do not use the following tires.

Wear:

- Tires with a tread groove of less than 15% of that of a new tire
- Tires with extreme uneven wear or with stepped-type wear

Damage:

- Tires with damage which has reached the cords, or with cracks in the rubber
- Tires with cut or pulled cords
- Tires with peeled (separated) surface
- Tires with damaged bead
- Leaking or improperly repaired tubeless tires
- Deteriorated, deformed or abnormally damaged tires which do not seem usable



14. Inspection of rims

⚠ WARNING

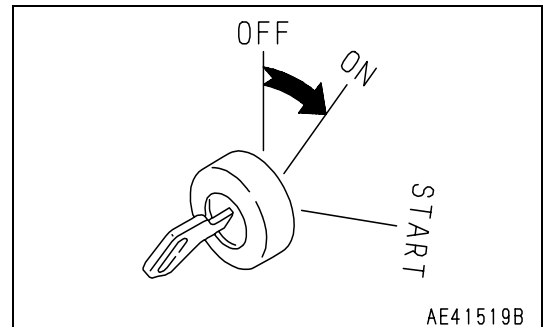
Check the rims (wheels) and rings for deformation, corrosion and cracks. In particular, check the side rings, lock rings and rim flanges thoroughly.

CHECK BEFORE STARTING

Always carry out the items in this section before starting the engine each day.

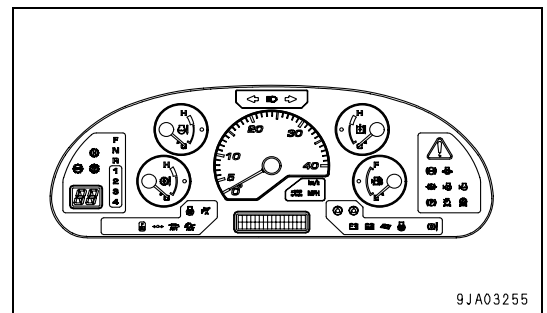
CHECK MONITOR PANEL

1. Turn the starting switch ON.



2. Check that all the monitors, gauges, and the central warning lamp light up for approx. 3 seconds and the alarm buzzer sounds for approx. 1 sec.

If the lamps do not light up, there is probably a failure or disconnection, so contact your Komatsu distributor for inspection.



CHECK COOLANT LEVEL, ADD WATER

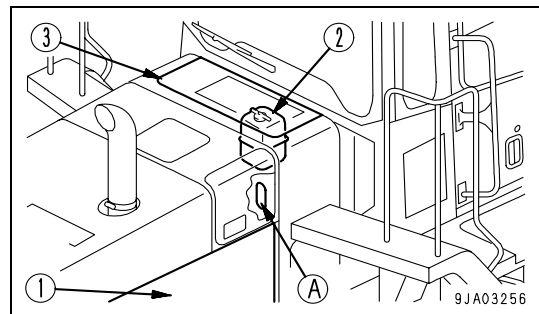
⚠ WARNING

- Do not open the radiator cap unless necessary. When checking the coolant, always wait for the engine to cool down and check the sub tank.
- Immediately after the engine is stopped, the coolant is at a high temperature and the radiator is under high internal pressure. If the cap is removed to check the coolant level in this condition, there is a hazard of burns. Wait for the temperature to go down, then turn the cap slowly to release the pressure before removing it.

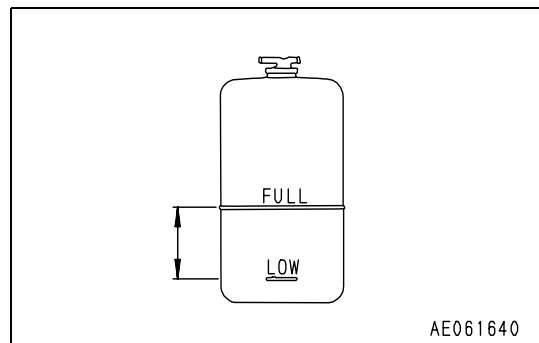
⚠ CAUTION

When adding water, use the step and handrail provided, and support your body securely.

1. Open side door (1) of the engine hood on the right side of the machine.
2. Look through inspection window (A) and check that the water level is in the range between FULL and LOW on sub tank (2). If the water level is low, open cover (3) and add water through the filler port of sub tank (2) until it reaches the FULL level.
3. After adding water, tighten the cap securely.
4. If sub tank (2) is empty, check for water leakage, then check the water level in the radiator. If the water level is low, add water to the radiator, then add water to sub tank (2).



If the volume of coolant added is more than usual, check for possible water leakage.
Confirm that there is no oil in the coolant.

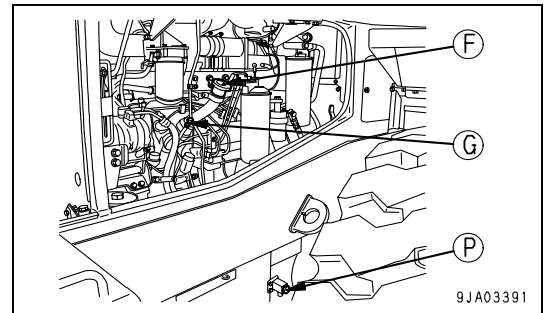


CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL

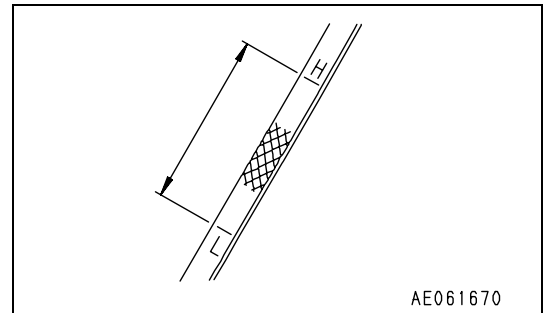
 **WARNING**

The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.

1. Open the inspection cover of the right side at the rear of the machine.
2. Take out the dipstick (G) and wipe off the oil with cloth.
3. Insert dipstick(G) fully in the oil filler pipe, then take it out again.
4. The oil level should be between the H and L marks on dipstick (G).
If the oil level is below the L mark, add engine oil through oil filler (F).
5. If the oil is above the H mark, drain the excess engine oil from drain plug(P), and check the oil level again.
6. If the oil level is correct, tighten oil filler cap (F) securely and close the inspection window.

**REMARK**

- When checking the oil level after the engine has been operated, wait for at least 15 minutes after stopping the engine before checking.
- If the machine is at an angle, make it horizontal before checking.



CHECK FUEL LEVEL, ADD FUEL

⚠ WARNING

When adding fuel, never let the fuel overflow. This may cause a fire. If any fuel is spilled, wipe it up completely. Never bring flames near fuel because it is highly flammable and dangerous.

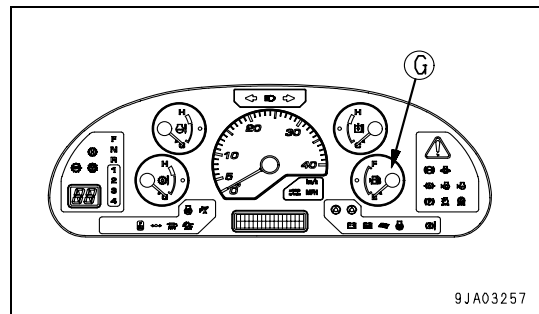
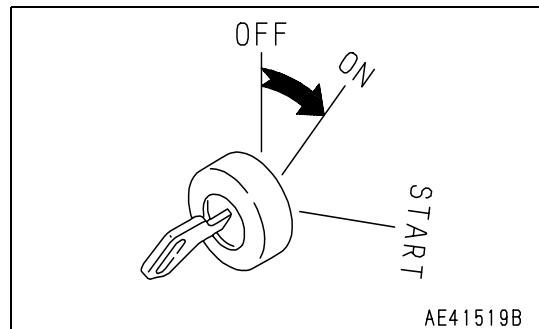
NOTICE

If the engine has run out of fuel and has stopped, it is necessary to operate the priming pump to bleed the air completely from the fuel line before starting the engine again.

Take care not to let the engine stop because of lack of fuel.

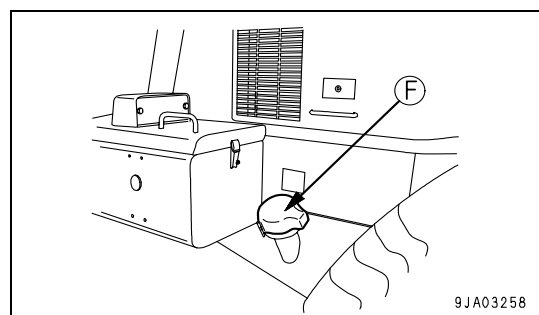
If the engine has run out of fuel, the air bleeding operation can be carried out more quickly if the fuel tank is completely filled with fuel.

1. Turn the engine starting switch to the ON position and check the fuel level with fuel level gauge (G).
After checking, turn the switch back to the OFF position.



2. After completing operations, add fuel through fuel filler (F) to fill the tank.
For details of the method for opening and closing the cap, see "CAP WITH LOCK (3-58)".
3. After adding fuel, tighten the cap securely.

Fuel capacity: 390 liters (103.04 US gal)



CHECK ELECTRIC WRINGS

 **WARNING**

- If the fuses frequently blow or if there are traces of short circuits on the electrical wiring, locate the cause immediately and carry out repairs, or contact your Komatsu distributor for repairs.
- Keep the top surface of the battery clean and check the breather hole in the battery cap. If it is clogged with dirt or dust, wash the battery cap to clean the breather hole.

Check for damage and wrong capacity of the fuse and any sign of disconnection or short circuit in the electric wiring. Check also for loose terminals and tighten any loose parts.

Check the wiring of the “battery”, “starting motor” and “alternator” carefully, in particular.

When carrying out checks around the battery, always check if there is any accumulation of flammable material around the battery, and remove such flammable material.

Please contact your Komatsu distributor for investigation and correction of the cause.

CHECK PARKING BRAKE

Check that the parking brake works properly.

If there is any abnormality in the operation of the parking brake or the brake does not provide the proper braking effect, please contact your Komatsu distributor for adjustment.

CHECK BRAKE PEDAL

Drive the machine forward and check the effect of the brakes.

If there is any abnormality in the actuation of the brakes, please contact your Komatsu distributor to have the brakes adjusted.

CHECK INFLATION PRESSURE OF TIRES

Measure the inflation pressure with a tire pressure gauge while the tires are cool before starting work.

Check for damage or wear to the tires and the rims.

Check for loose wheel hub nuts (bolts).

The proper inflation pressure is shown below.

Tire size	Inflation pressure
23.5-25-20PR (L3 Rock) (standard)	Front Tire: 0.39MPa (4.0kgf/cm ² , 56.8 PSI) Rear Tire: 0.31MPa (3.2kgf/cm ² , 45.44 PSI)
26.5-25-16PR (L3 Rock) (if equipped)	Front Tire: 0.34MPa (3.5 kgf/cm ² , 49.7 PSI) Rear Tire: 0.29MPa (3.0 kgf/cm ² , 42.6 PSI)
26.5-25-20PR (L3 Rock) (if equipped)	

NOTICE

The optimum inflation pressure differs according to the type of work. For details, see “HANDLING THE TIRES (3-115)” .

ADJUSTMENT

SEAT ADJUSTMENT

WARNING

- When adjusting the operator's seat, stop the machine in a safe place before starting the operation.
- Adjust the seat before starting operations for the day or when changing operators.
- When adjusting the seat, put your back against the backrest and adjust to a position where the brake pedal can be fully depressed.

Standard type

(A) Fore-and-aft adjustment

Pull lever (1) up, set the seat to the desired position, then release the lever.

Fore-and-aft adjustment: 160 mm (6.3 in)
(16 mm (0.6 in) x 10 stages)

(B) Adjusting seat angle

Move lever (2) up and push down on the rear of the seat to tilt it backward.

Move lever (2) down and push down on the front of the seat to tilt it forward.

Adjustment range: 13° (Front tilt, rear tilt: 4 stages each)

(C) Adjusting seat weight

Turn grip (3) to adjust the strength of the suspension.

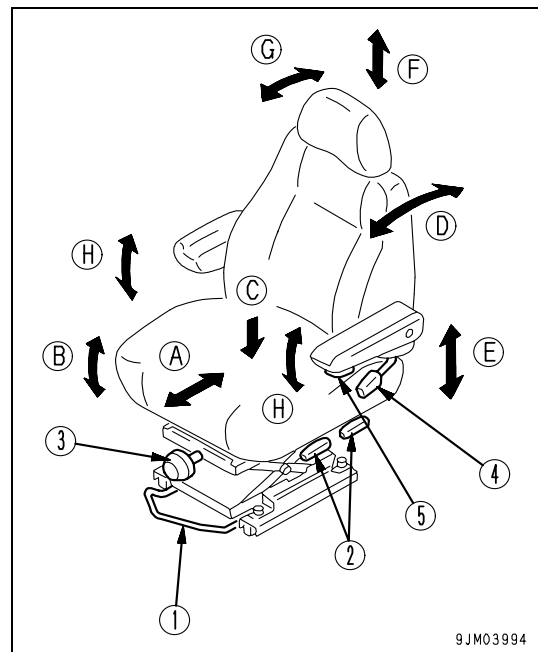
Adjustment range: (Target) 50 kg to 120 kg ((110 to 265 lb))

(D) Adjusting backrest angle

Move lever (4) up and move the backrest to the front or rear.

Adjustment range: Front 66 degrees ((3 degrees x 22 stages))

Rear 72 degrees ((3 degrees x 24 stages))



NOTICE

If the seat back is reclined too far, the seat back may hit the rear glass, so use it in a position where it does not contact the glass.

When reclining the seat fully to take a rest, set the seat in the following position.

- Fore-and-aft adjustment: Max. front position
- Up-down adjustment: Max. height
- Seat angle adjustment: Horizontal or fully tilted
- Reclining adjustment: Fully tilted backward 36 degrees ((12 stages))

(E) Seat height adjustment

Move lever (2) up/down, then move the seat up or down as desired. Since lever (2) is also used for adjusting seat angle, set the seat to the desired height while adjusting the angle.

Adjustment range: 60 mm (2.4 in)

(F) Adjusting height of headrest

Move the headrest up and down to the desired height.

Adjustment range: 50 mm (2.0 in)

(G) Adjusting headrest angle

Rotate the headrest to the front or rear.

(H) Angle of armrest

Adjust angle of armrest by rotating knob (5) (left side only).

Adjustment range: 30 degrees ((forward tilt: 25 degrees, backward tilt:5 degrees)

Also, when armrest is turned, it will spring up. (Both left and right sides)

(I) Lumbar support

Turn grip (6) to adjust the tension applied to the lower back.

Turn grip (6) in the direction of the arrow.

The tension can be adjusted to 5 stages. If the grip is turned beyond the 5th stage, the tension will return to the 1st stage.

Lumbar support type

Adjustments (E), (J), and (K) use the air compressor built into the seat, so turn the engine starting switch to the ON position when carrying out the adjustment.

(A) Fore-and-aft adjustment

Pull lever (1) up, set the seat to the desired position, then release the lever.

Amount of adjustment: 180 mm (7.1 in)

(10 mm (0.4 in) x 18 stages)

(B) Adjusting seat angle

Move lever (2) up and apply your weight to the rear of the seat. The seat will tilt to the rear.

Move lever (3) up and apply your weight to the front of the seat. The seat will tilt to the front.

Amount of adjustment: 24 degrees (front and rear tilt: 3 stages each)

(C) Adjusting height of seat

Move levers (2) and (3) up and move the seat up or down to the desired position.

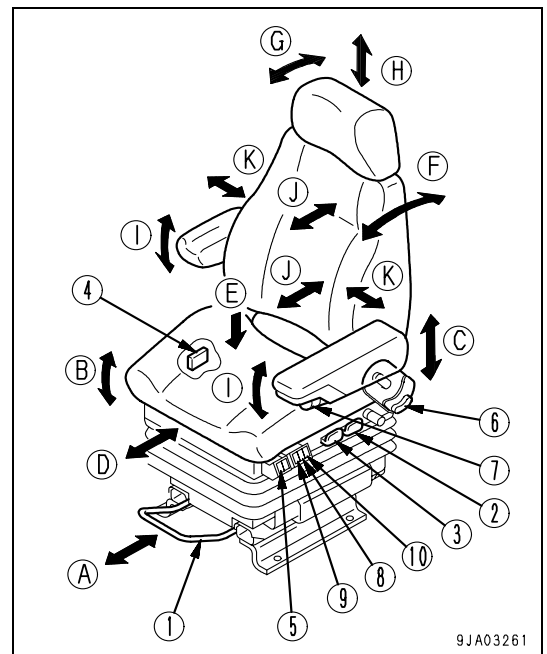
These levers are also used for adjusting the seat angle, so adjust the seat angle to set the seat to the desired height.

Amount of adjustment: 65 mm (2.6 in)

(D) Adjusting fore-and-aft position of seat cushion

Push in lever (4), set the seat cushion to the desired position, then release the lever.

Amount of adjustment: 60 mm (2.4 in)



(E) Adjusting weight setting for seat

Sit on the seat, raise your body slightly, then operate switch (5) to adjust the strength of the suspension.

Amount of adjustment: 50 - 130 kg (110 - 287 lb)(target)

When + is pressed: Suspension becomes stronger

When - is pressed: Suspension becomes weaker

(F) Adjusting reclining angle

Move lever (6) up and move the seat backrest to the front or rear.

Push your back against the backrest when carrying out this adjustment. If your back is not pressing against the backrest, the backrest may suddenly spring forward.

Amount of adjustment: Front tilt: Free

Rear tilt: 40 degrees (2 degrees x 20 stages)

(G) Adjusting angle of head rest (if equipped)

Rotate the headrest to the front or rear.

Amount of adjustment:

Front tilt: 13 degrees

Rear tilt: 13 degrees

(H) Adjusting height of head rest (if equipped)

Move the head rest up or down.

Amount of adjustment: 80 mm (3.2 in)

(I) Adjusting angle of arm rest

Rotate the knob (7) and adjust the angle of the arm rest. (Left side only)

Amount of adjustment: 73 degrees (front: 54 degrees; rear: 19 degrees)

If the arm rest is turned, it will spring up. (Both left and right sides)

(J) Lumbar support

Operate switch (8) to give a suitable tension to the lower lumbar region.

Operate switch (9) to give a suitable tension to the upper lumbar region.

When + is pressed: Tension becomes stronger

When - is pressed: Tension becomes weaker

(K) Side support

Operate switch (10) to give a suitable tension to the left and right lumbar region.

When + is pressed: Tension becomes stronger

When - is pressed: Tension becomes weaker

ADJUST SEAT BELT

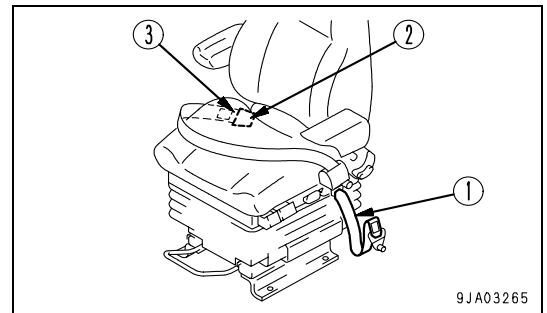
Always wear the seat belt.

**WARNING**

- Before fastening the seat belt, check that there is no abnormality in the belt mounting bracket or mounting belt. If the belt is worn or damaged, replace it.
- Fasten the seat belt before starting operations.
- Always wear the seat belt during operations.

Fastening and removing belt

1. Sit on the seat, hold buckle (2) and tongue (3) with your left and right hands, insert tongue (3) into buckle (2), then pull the belt to check that it is securely locked.
2. When removing the belt, press the red button in buckle (2) to free the belt.
Fasten belt along your body without kinking it.



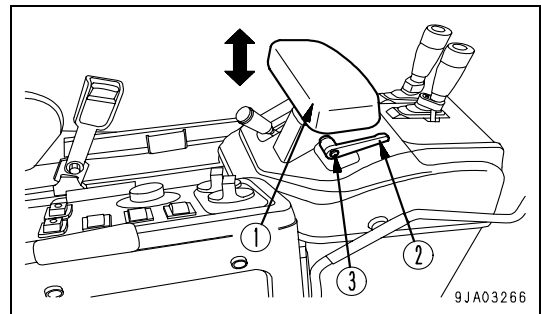
ADJUST LEVER STAND

Adjust height of wrist rest

Loosen lock lever (2) and adjust the height of wrist rest (1).
Amount of adjustment: 55 mm (2.2 in)

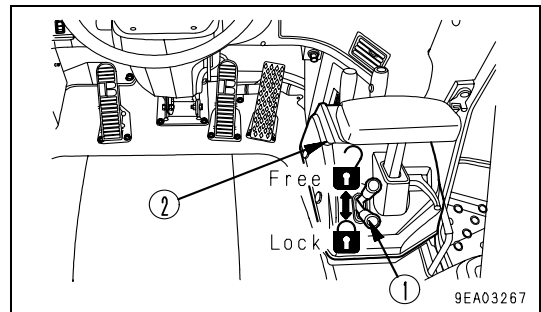
REMARK

Keep button (3) pressed and operate lock lever (2) to the FREE position. The lever can be turned in the desired direction.



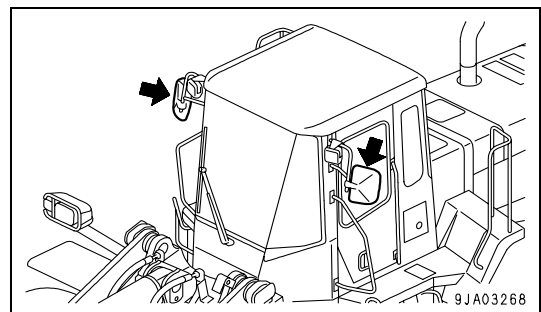
Adjust angel of lever stand

Operate lock lever (1) to the FREE position, grip the wrist rest and tilt lever stand (2) to the front or rear, then return lock lever (1) to the LOCK position.
Amount of adjustment: 65 mm (2.6 in)



ADJUST REAR VIEW MIRROR

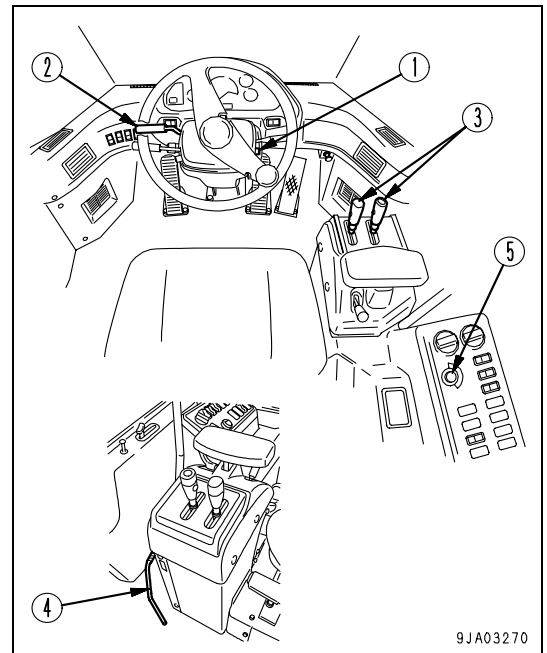
Sit in the operator's seat and adjust the rear view mirror so that you can see properly to the rear.



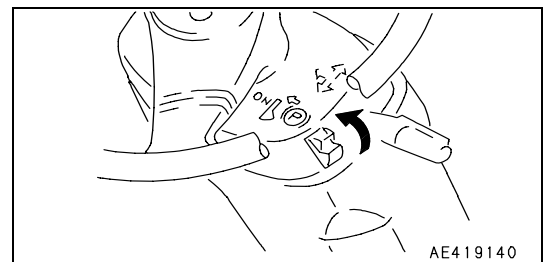
OPERATIONS AND CHECKS BEFORE STARTING ENGINE

⚠ WARNING

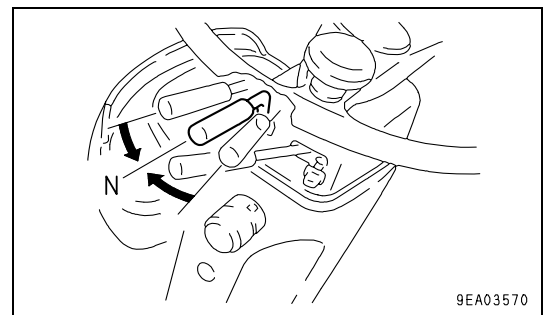
Before starting the engine, check that the safety lock lever is securely at the LOCK position.
 If the work equipment control lever is touched by mistake when starting the engine, the work equipment may move unexpectedly and cause serious damage or personal injury.



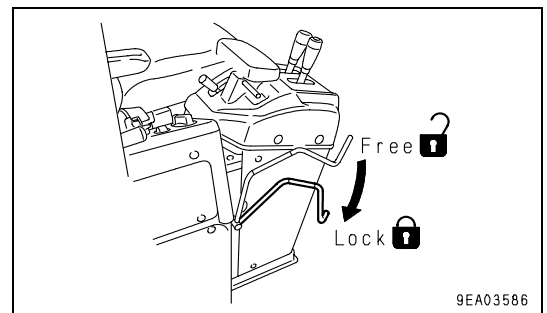
1. Check that parking brake switch (1) is at the ON position.



2. Check that directional lever (2) is at the N position.
 When starting the engine, if directional lever (2) is not at the N position, the engine will not start.



3. Lower the bucket to the ground, then check that work equipment control lever (3) is locked by safety lock (4).

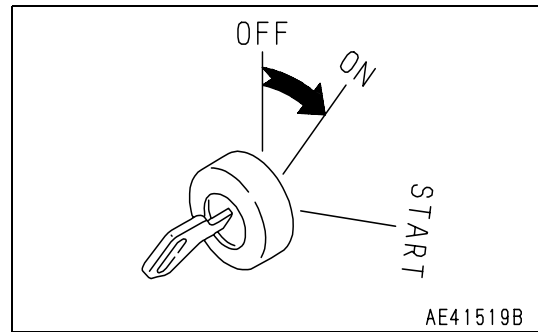


4. Insert the key in starting switch (5), turn the key to the ON position, and check that the machine monitor system works.

When the starting switch is turned to the OFF position before starting the engine, all the monitors, gauges, and central warning lamp light up for approx. 3 seconds, and the alarm buzzer sounds for approx. 1 sec.

If any monitor does not light up, there is probably a failure or disconnection, so contact your Komatsu distributor for inspection.

In addition, after all the monitors, gauges, and central warning lamp light up, a self check is carried out to check that the emergency steering function works properly. For details, see "EMERGENCY STEERING SELF-CHECK FUNCTION (3-97)" in the OPERATION section.



STARTING ENGINE

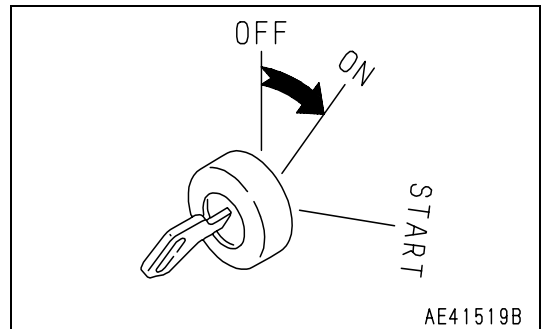
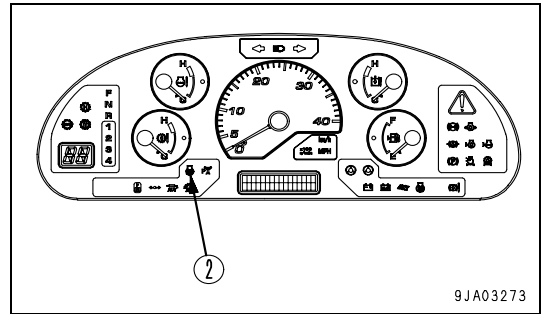
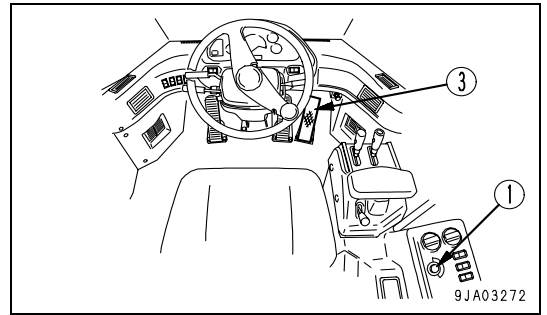
⚠ WARNING

- Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.
- Exhaust gas is toxic. When starting the engine in confined spaces, be particularly careful to ensure good ventilation.

NOTICE

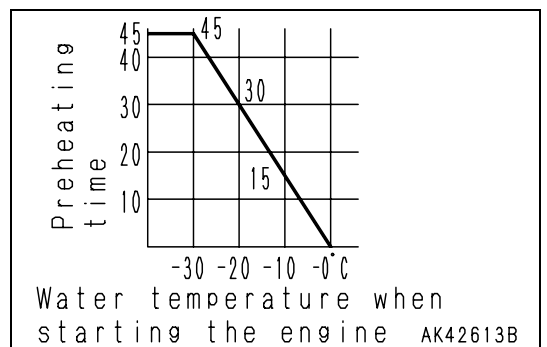
- Do not accelerate the engine suddenly before the warming-up operation is completed.
- Do not crank the starting motor continuously for more than 20 seconds.
- If the engine does not start, wait for at least two minutes before trying again.
- If the accelerator pedal is kept pressed after the engine is started, the engine speed will rise suddenly after the turbo protect time, and this may damage the turbo-charger.

1. Turn the key in starting switch (1) to the ON position. Preheating will automatically start and preheating pilot lamp (2) will light up.

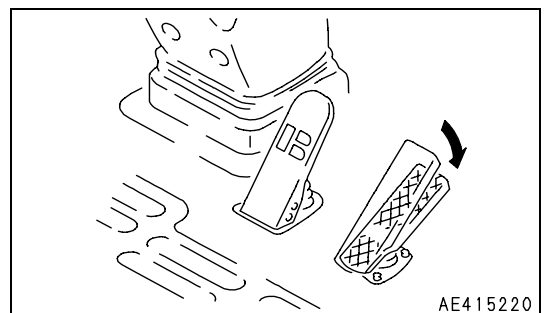


The table shown below gives a guide to preheating time.

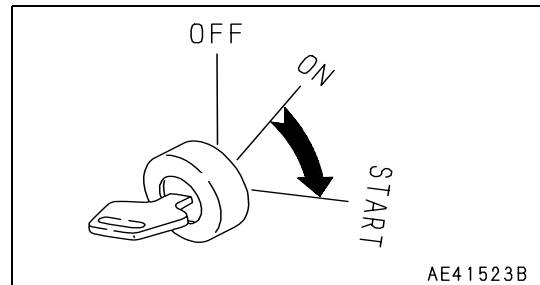
The preheating time in cold areas changes according to the water temperature when starting the engine.



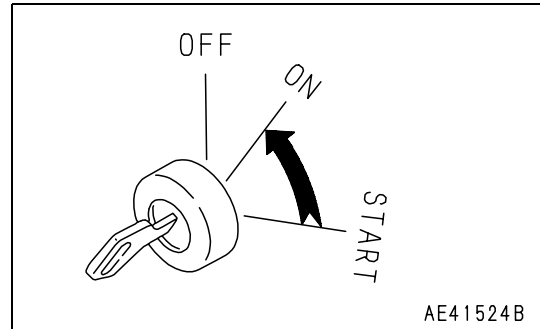
2. Depress accelerator pedal (3) lightly.



3. When preheating pilot lamp (2) goes out, turn the key in starting switch (1) to the START position.
The starting motor will be cranked and after the engine rotates under no load for 2 or 3 seconds, the engine will start.



4. After the engine starts, release the key in starting switch (1). The key will automatically return to the ON position.
5. After the engine starts, if the engine water temperature is low (below 20 °C (68 °F)), the warming-up operation (engine speed: 1130 rpm) is automatically carried out. For details, see "AUTOMATIC WARMING-UP OPERATION (3-83)".



REMARK

- Because of the turbo protect function, immediately after the engine starts, even if the accelerator pedal is depressed, the engine speed will not rise above 1130 rpm.

Engine water temperature	Turbo protect time
above 20°C (68°F)	0 sec.
-18°C to 20°C (-0.4°F to 68°F)	0 to 12 sec.
Below - 18°C (-0.4°F)	15 sec.

- The turbocharger rotates at extremely high speed. Immediately after the engine is started, the pressure of the lubricating oil has not risen sufficiently, so if the engine speed is suddenly raised, it may lead to damage or seizure of the turbocharger bearing. The turbo protect function acts to prevent this problem. It uses electronic control to prevent the engine speed from rising above a certain speed for the first few seconds after the engine started.
- To improve the ease of starting in cold weather, the low idling speed becomes slightly higher for the time given below and the engine sound is different. In addition, it functions to make the acceleration gradual during this time.

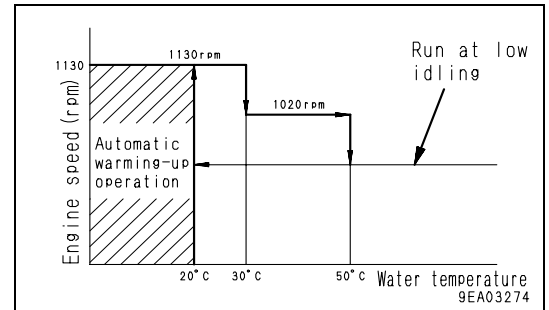
Engine water temperature	Injection characteristics change time
above 20°C (68°F)	0 sec
0°C to 20°C (32°F to 68°F)	0 to 6 sec
-20°C to 0°C (-4°F to 32°F)	6 to 12 sec
-30°C to -20°C (-22°F to -4°F)	12 to 15 sec

AUTOMATIC WARMING-UP OPERATION

After the engine starts, if the engine water temperature is low (below 20°C (68°F)), the warming-up operation (engine speed: 1130 rpm) is automatically carried out. When the water temperature goes above 50°C (122°F), the warming-up operation is canceled.

REMARK

The automatic warming-up operation changes as shown in the diagram on the right according to the engine water temperature.



OPERATIONS AND CHECKS AFTER STARTING ENGINE

WARNING

- Emergency stop
- If the operation is abnormal or any other trouble occurs, turn the key in the starting switch to the OFF position.
- If the work equipment is operated without warming up the machine sufficiently, the response of the work equipment to the movement of the control lever will be slow, and the work equipment may not move as the operator desires, so always carry out the warming-up operation. Particularly in cold areas, be sure to carry out the warming-up operation fully.

BREAKING IN THE MACHINE

CAUTION

Your Komatsu machine has been thoroughly adjusted and tested before shipment. However, operating the machine under severe conditions at the beginning can adversely affect the performance and shorten the machine life.

Be sure to breaking-in the machine for the initial 100 hours (as indicated by the service meter). During breaking-in operations, follow the precautions described in this manual.

- Idle the engine for 5 minutes after starting it up.
- Avoid operation with heavy loads or at high speeds.
- Avoid sudden starts, sudden acceleration, sudden steering and sudden stops except in cases of emergency.

NORMAL OPERATION

After starting the engine, do not immediately start operations. First, carry out the following operations and checks.

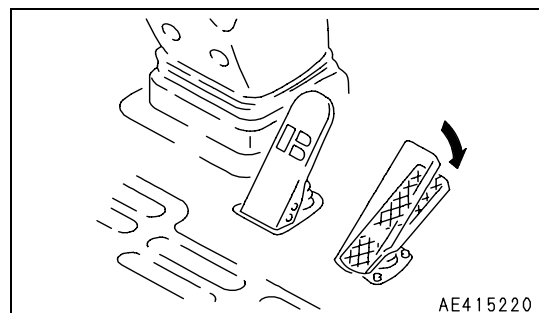
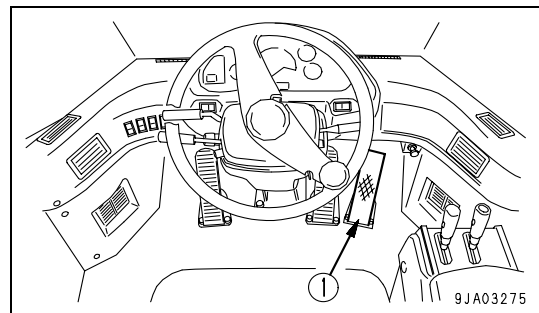
NOTICE

Do not suddenly accelerate the engine before the warming-up operation is completed.

Do not run the engine at low idling or high idling continuously for more than 20 minutes.

If it is necessary to run the engine at idling, apply a load from time to time or run the engine at a mid-range speed.

1. Depress accelerator pedal (1) lightly and run the engine with no load at midrange speed for about 5 minutes.



2. To warm up the hydraulic oil only in cold areas, do as follows.

During the warming-up operation, check that the engine rotation is smooth, then set the safety lock of the work equipment control lever to the FREE position and move the bucket control lever in and out of the TILT position to warm up the hydraulic oil.

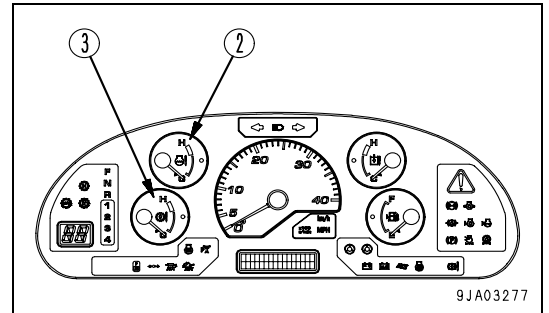
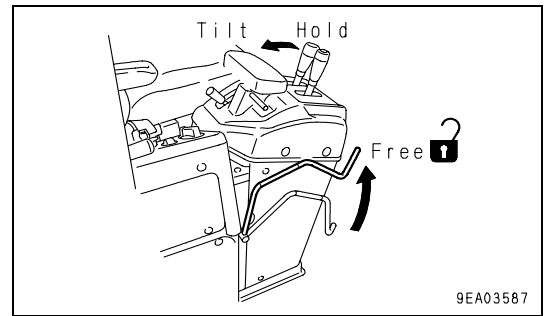
The relief time at the tilt position should be a maximum of 10 seconds.

With this operation, the oil will reach the relief pressure and this will warm up the hydraulic oil more quickly.

3. After carrying out the warming-up operation, check that the gauges and caution lamps are normal.

If there is any abnormality, carry out maintenance or repair. Run the engine under a light load until engine cooling water temperature gauge (2) and torque converter oil temperature gauge (3) are in the green range.

4. Check that there is no abnormal exhaust gas color, noise, or vibration. If any abnormality is found, please contact your Komatsu distributor.



REMARK

The sound of the cooling fan rotation differs according to the following conditions, but this does not indicate any abnormality.

The cooling fan speed increases when the hydraulic oil temperature, engine coolant temperature, or transmission oil temperature are high.

However, when the cooling fan is rotating in reverse, it rotates at a fixed speed proportional to the engine speed, regardless of any oil or coolant temperature.

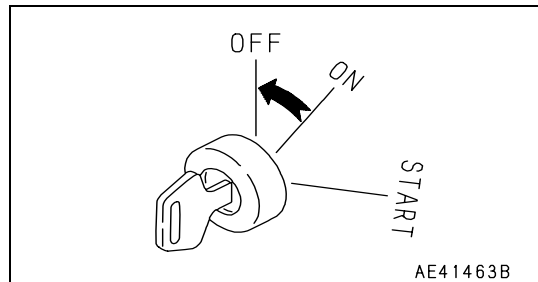
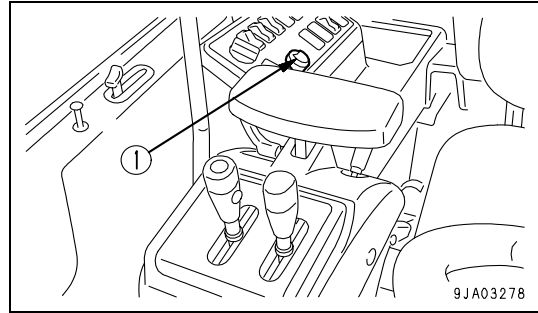
STOPPING ENGINE

NOTICE

If the engine is abruptly stopped before it has cooled down, engine life may be greatly shortened. Consequently, do not abruptly stop the engine apart from an emergency.

In particular, if the engine has overheated, do not abruptly stop it but run it at medium speed to allow it to cool gradually, then stop it.

1. Run the engine at low idling for about 5 minutes to cool down gradually.
2. Turn the key of starting switch (1) to the OFF position to stop the engine.
3. Remove the key from starting switch (1).



CHECK AFTER STOPPING ENGINE

1. Walk around the machine and check the work equipment, body work, and undercarriage, and check also for leakage of oil and water.
2. Fill the fuel tank.
3. Check the engine compartment for paper and debris. Clean out any paper and debris to avoid a fire hazard.
4. Remove any mud affixed to the undercarriage.

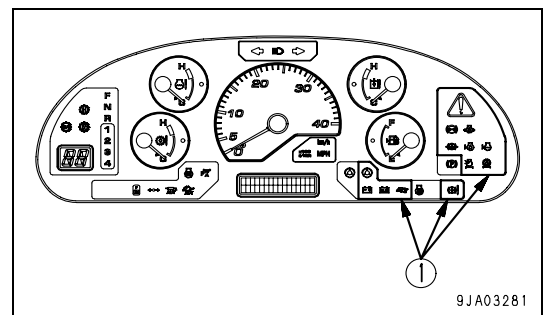
MOVING MACHINE OFF (DIRECTIONAL, SPEED), STOPPING

WARNING

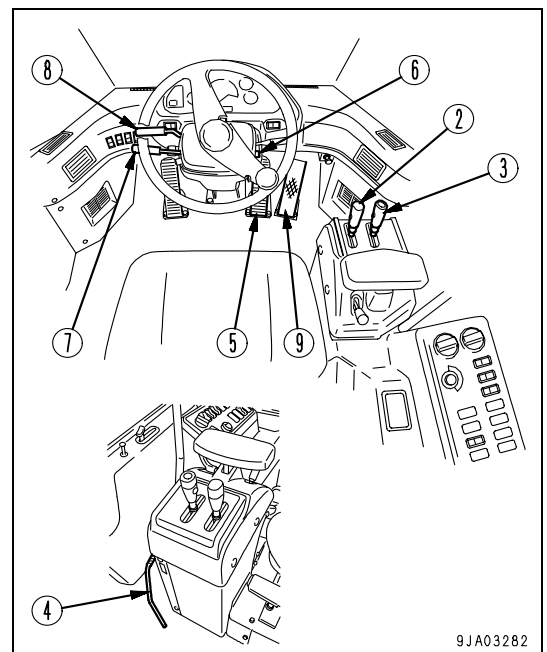
- When moving the machine off, check that the area around the machine is safe and sound the horn to give a warning.
- Do not allow anyone in the area around the machine.
- Remove any obstacles from the travel path.
- There is a blind spot at the rear of the machine, so be particularly careful when traveling in reverse.
- When moving the machine off up a hill, turn the transmission cut-of switch OFF, depress the left brake pedal, then depress the accelerator pedal and gradually release the brake pedal to let the machine move off. This makes it possible to prevent the machine from rolling back.

PREPARATIONS FOR MOVING MACHINE

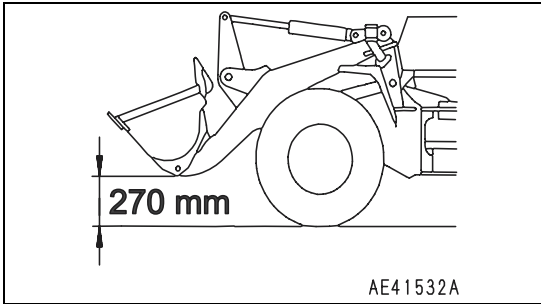
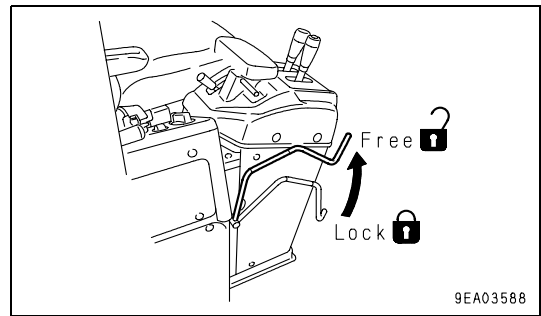
1. Check that warning pilot lamp (1) is not lighted up.



2. Set safety lock (4) of bucket control lever (2) and lift arm control lever (3) to the FREE position.



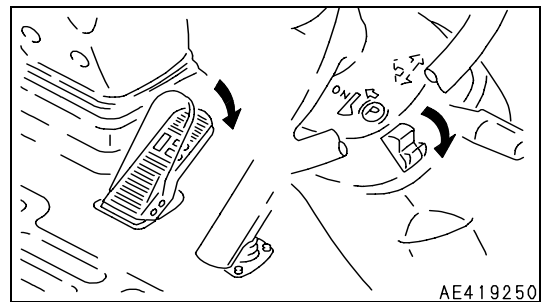
- 3. Operate lift arm control lever (3) to set the work equipment to the travel posture shown in the diagram on the right.



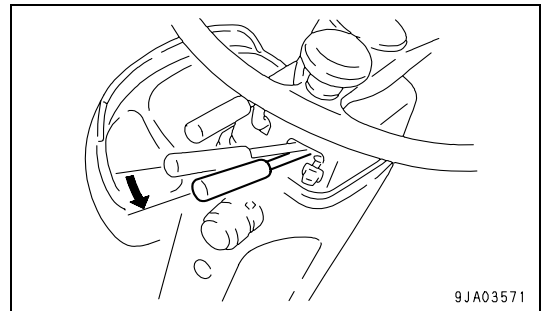
- 4. Depress right brake pedal (5) and turn parking brake switch (6) to the OFF (RELEASE) position to release the parking brake.
Keep right brake pedal (5) depressed.

REMARK

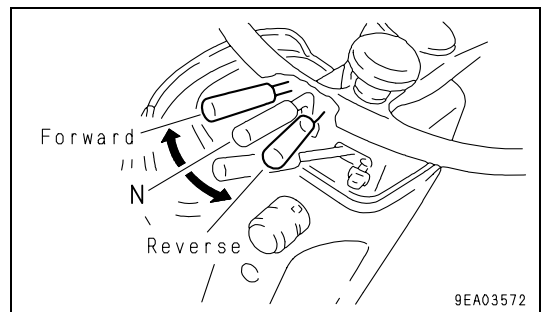
If the parking brake is still actuated when parking brake switch (6) is at the OFF (RELEASE) position, turn the parking brake switch ON, then turn it OFF again.



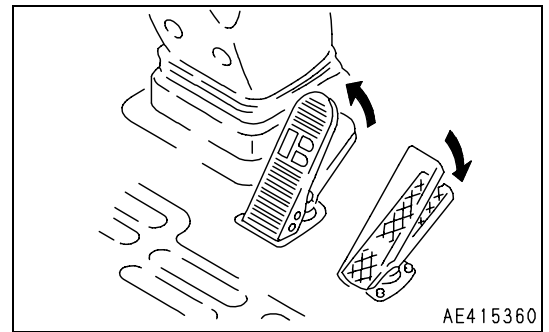
- 5. Set speed control lever (7) to the desired position.



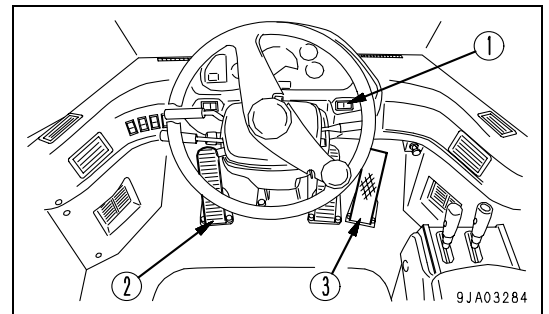
- 6. Set directional lever (8) to the desired position.



7. Release right brake pedal (5), then depress accelerator pedal (9) to move the machine off.

**REMARK**

When moving the machine off on a hill, turn transmission cut-off switch (1) OFF, depress left brake pedal (2), operate the gearshift lever to the travel position, then depress accelerator pedal (3) and gradually release left brake pedal (2) to let the machine move off. This makes it possible to prevent the machine from rolling back.



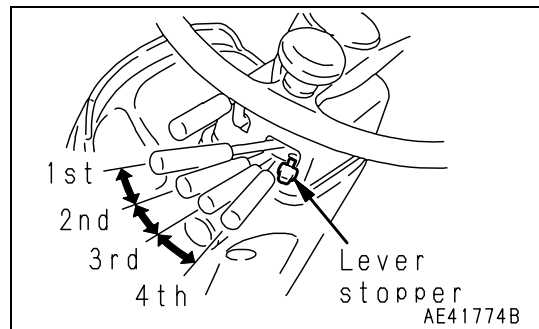
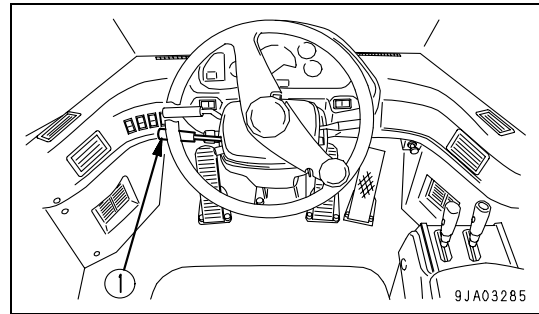
CHANGING GEAR SPEED

⚠ WARNING

When traveling at high speed, do not shift gear suddenly. Use the brake to reduce the travel speed before shifting gear.

Shift gear as follows.

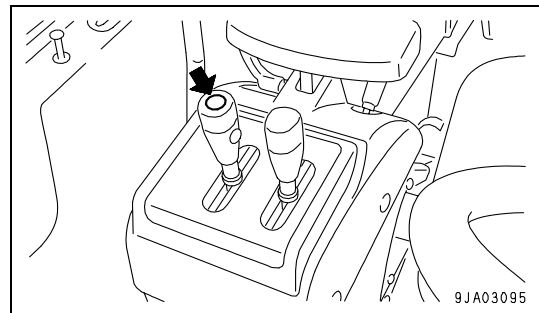
Move the gearshift lever (1) to the desired position to shift gear. When carrying out digging or loading operations, the operation is carried out in 1st or 2nd, so use the gearshift lever stopper.

**REMARK**

- This machine is equipped with the kick-down switch. When the machine is traveling in 2nd, press the button on the tip of the lift arm control lever to shift down to 1st.

We recommend use of the kick-down switch when carrying out operations in 1st or 2nd, such as digging or loading.

- For details of the method of use, see "KICKDOWN SWITCH (3-43)".
- This machine is equipped with an auto-shift system that automatically shifts the gear. For details of the method of use, see "TRANSMISSION SHIFT MODE SELECTOR SWITCH (3-38)" and "AUTOMATIC SHIFT (3-52)".
- If the gearshift lever is operated slowly or is stopped between gear positions, "E01 MAINTENANCE" may be displayed on the character display. In this case, there is no failure, but try to operate the gearshift lever so that the gearshifting is completed within 2 seconds.



CHANGING DIRECTION

⚠ WARNING

- When changing direction between FORWARD and REVERSE, check that the new direction of travel is safe. There is a blind spot behind the machine, so be particularly careful when changing direction to travel in reverse.
- Do not switch between FORWARD and REVERSE when traveling at high speed.
- When switching between FORWARD and REVERSE, depress the brake to reduce the travel speed sufficiently, then change the direction of travel. (Max.speed for changing direction: 12 km/h (7.5 MPH))

There is no need to stop the machine even when switching between FORWARD and REVERSE.
Place directional lever (1) in the desired position.

REMARK

There is a directional selector switch (if equipped) which makes it possible to change the direction of travel by operating a switch.

If an attempt is made to switch the direction between forward and reverse while traveling at high speed (when using 3rd or 4th), if the travel speed and engine speed are in ranges I or II in the chart on the right, the central warning lamp will light up and the buzzer will sound.

At the same time, "E00 OVERRUN PROTECT" is displayed on the character display.

If the alarm buzzer sounds, depress the brake immediately to reduce the travel speed, then operate the directional lever to switch between forward and reverse.

WHEN USING AUTO-SHIFT

If an attempt is made to switch the direction between forward and reverse when the auto-shift is ON, normally, the gearshift range will switch F3 -> R2, F4 -> R2, or R3 -> F2, R4 -> F2 to make it possible to move the machine off quickly.

However, if an attempt is made to shift between forward and reverse when the machine is traveling at high speed such as shown in ranges I or II in the chart on the right, the central warning lamp will light up and the buzzer will sound.

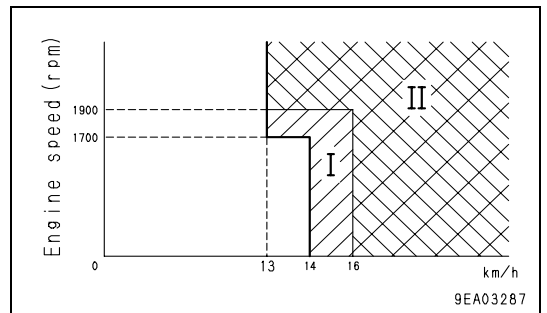
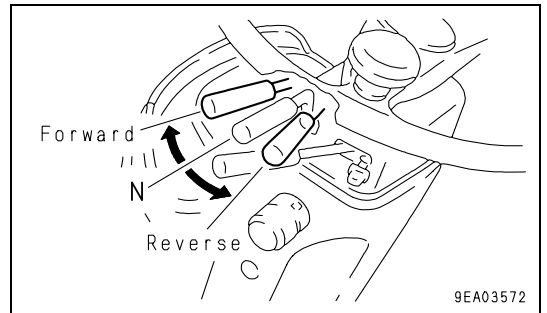
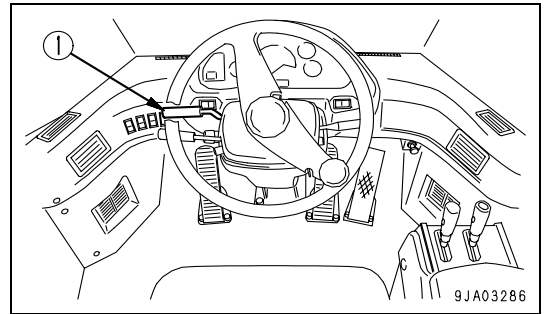
At the same time, "E00 OVERRUN PROTECT" is displayed on the character display.

If the alarm buzzer sounds, depress the brake immediately to reduce the travel speed, then operate the directional lever to switch between forward and reverse.

In particular, if it is attempted to switch between forward and reverse in range II, the gearshift range will not shift to 2nd, but will switch F3 -> R3, F4 -> R4, or R3 -> F3, R4 -> F4. As a result, the reduction in travel speed will be less than a range I, so care is necessary.

REMARK

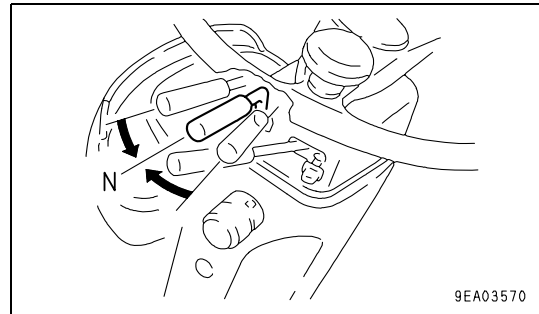
If the gearshift lever is operated slowly or is stopped midway between the forward and reverse directions, "E01 MAINTENANCE" may be displayed on the character display. In this case, there is no failure, but try to operate the directional lever so that the change in direction is completed within 2 seconds.



USING SWITCH TO CHANGE BETWEEN FORWARD AND REVERSE

(If equipped)

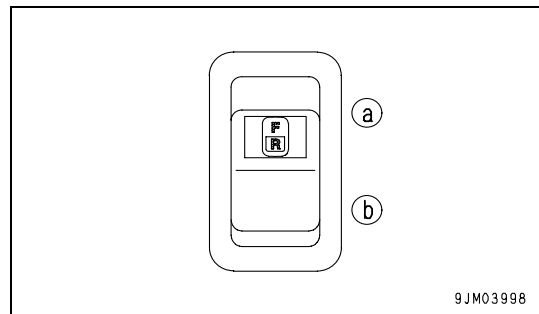
1. Place the directional lever at the N position.



2. Turn the directional selector switch actuation switch on the right switch panel ON.

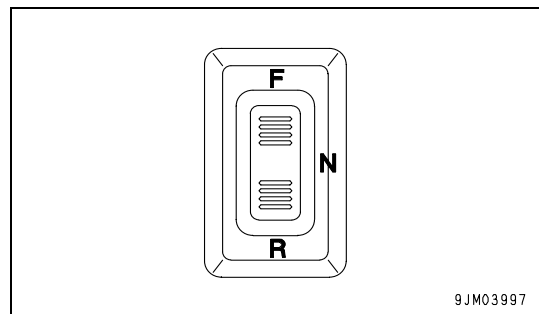
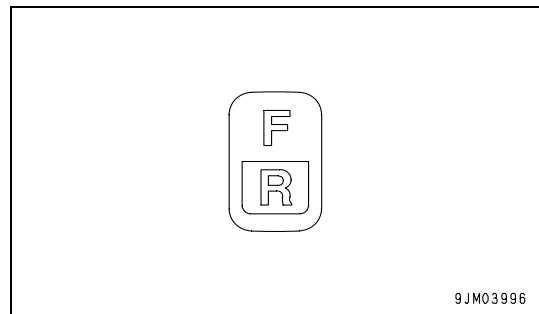
The pilot lamp inside the switch and the directional selector pilot lamp on the machine monitor light up.

This actuates the operation of the directional selector switch.



If the directional selector pilot lamp on the machine monitor flashes, the switch for the lever is in one of the following conditions. Set it to the correct position.

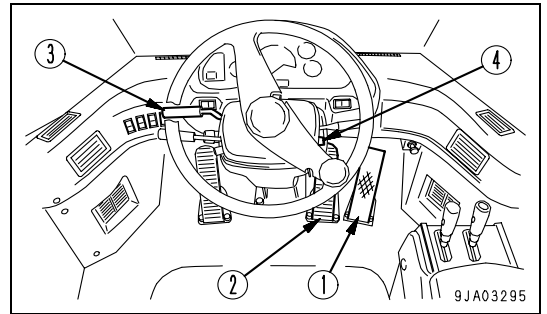
- When directional lever is not at N position
 If the directional lever is not at the N position, the pilot lamp flashes, and at the same time, the central warning lamp lights up and the alarm buzzer sounds. In addition, "E00 SHIFTLEVER NEUT" is displayed on the character display. In this condition, the machine will move forward or in reverse according to the set position of the directional lever. Return the directional lever to the N position.
 - When directional selector switch is at F or R when engine is started
 If the directional selector switch is at F or R, the pilot lamp flashes, and at the same time, the central warning lamp lights up and the alarm buzzer sounds. In addition, "E00 SHIFT SW NEUT" is displayed on the character display. In this condition, the engine will not start, so set the directional selector switch to N.
3. Press the selector switch on the side of the control lever to the desired position.



STOPPING MACHINE

⚠ WARNING

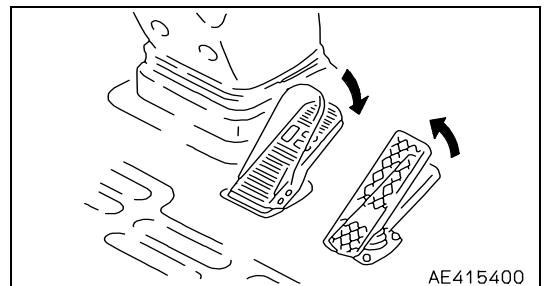
- Avoid stopping suddenly. Give yourself ample room when stopping.
- Even if the parking brake switch is turned ON, there is danger until the parking brake pilot lamp lights up, so keep the brake pedal depressed.



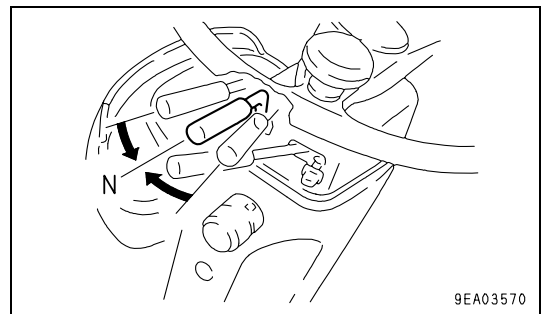
NOTICE

Never use the parking brake switch to brake the machine when traveling except in an emergency. Apply the parking brake only after the machine has stopped.

1. Release accelerator pedal (1), then depress brake pedal (2) to stop the machine.



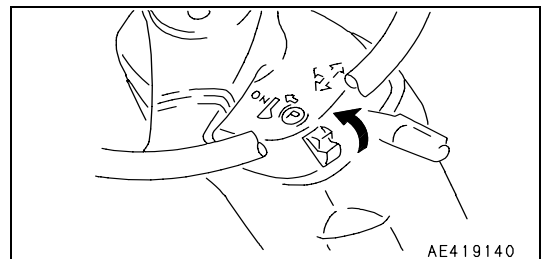
2. Place directional lever (3) in N (neutral) position.



3. Turn parking brake switch (4) to ON to apply the parking brake.

REMARK

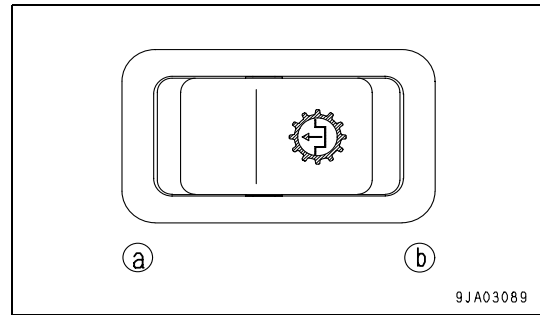
When the parking brake is applied, the transmission is automatically returned to neutral.



TRANSMISSION CUT-OFF FUNCTION

When the transmission cut-off switch is pressed, the pilot lamp lights up, and the following transmission cut-off function is actuated.

When the left brake pedal is depressed, the brake is actuated, and in addition, the transmission is shifted to neutral at the pre-selected brake pedal depression position.

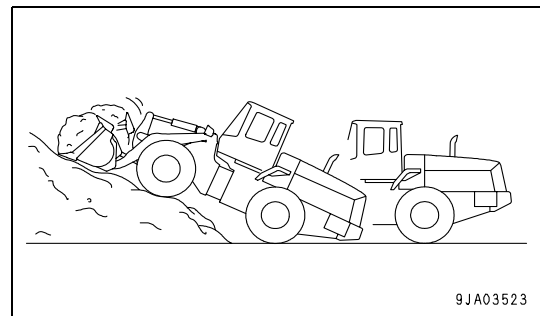


REMARK

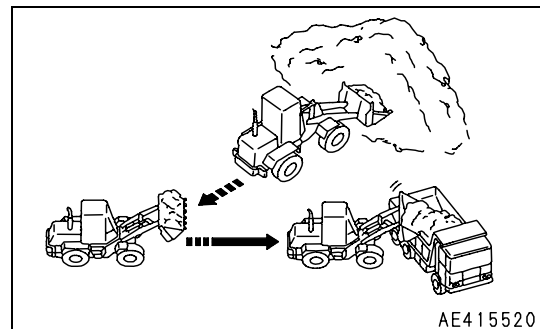
- The cut-off function is actuated only with the left brake pedal.
- When the transmission cut-off switch is at the OFF position, the left brake pedal works in the same way as the right brake pedal.

For details of adjusting the brake pedal depression position, see “ADJUSTING TRANSMISSION CUT-OFF POSITION (3-95)”.

- Raise or lower the pre-selected brake pedal depression position to adjust the cut-off to match the type of work.
- When carrying out scooping-up work, the brake pedal depression position is lowered for the cut-off (transmission shifted to neutral), and the transmission driving force is cut at a point where there is ample braking force, so this prevents the machine from slipping down.



- When approaching dump trucks during loading operations, the brake pedal depression position is raised for the cut-off (transmission shifted to neutral), and the fine control of the braking immediately before dumping the load is carried out with the brake only, so this makes it easy to control and allows the machine to be brought to a soft stop.



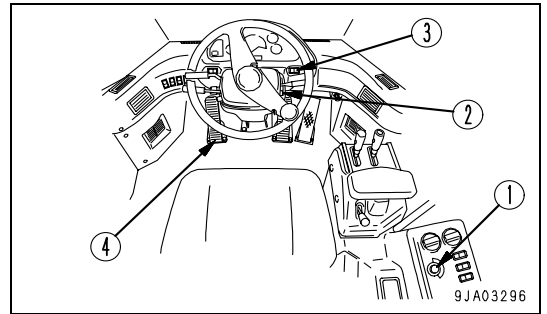
ADJUSTING TRANSMISSION CUT-OFF POSITION

⚠ CAUTION

Apply the parking brake before adjusting the transmission cut-off position.

In the transmission cut-off function, it is possible to adjust the depression position of the left brake pedal used to shift the transmission to neutral.

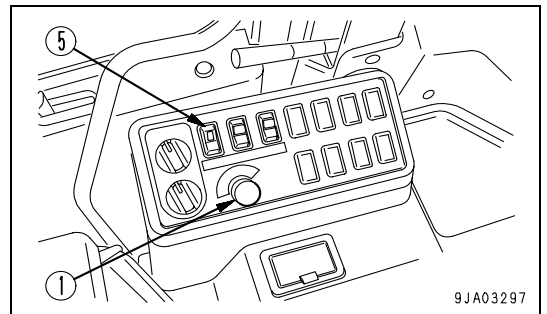
1. Start the engine with starting switch (1), then set parking brake switch (2) to the ON position.
2. Set transmission cut-off switch (3) to the ON position.
3. Depress left brake pedal (4) and set it to the desired position to shift the transmission to neutral.



4. Press transmission cut-off set switch (5), then release it. When the switch is released, the buzzer will sound with a repeated short sound, and the cut-off position is set.

Method of canceling cut-off position

5. After the buzzer sounds in Step 4 of the adjustment procedure, the transmission cut-off switch flashes for 2 seconds. While it is flashing, press transmission cut-off set switch (5) again and release it.
6. The buzzer will sound with a long sound and the adjusted cut-off position is canceled.



STOPPING WHEN TRANSMISSION CUT-OFF IS ON

When the transmission cut-off switch is at the ON position and the left brake pedal is depressed, the transmission is shifted to neutral at the pre-selected brake pedal depression position. The transmission is not shifted to neutral when the right brake pedal is operated.

REMARK

When the transmission cut-off switch is OFF, the left brake pedal acts in the same way as the right brake pedal, and the transmission is not shifted to neutral.

TURNING

! WARNING

- Operating the steering wheel suddenly at high speed or operating the steering wheel on steep slopes is dangerous. Do not operate the steering wheel in such situations.
- If the engine stops when the machine is traveling, the emergency steering is actuated. Note that this system is only for steering in emergencies, so never stop the engine.

It is particularly dangerous if the engine stops when the machine is traveling on slopes, so never let the engine stop when traveling on slopes.

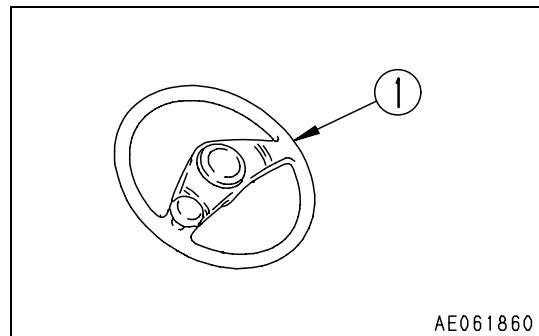
- If the engine stops, stop the machine immediately at a safe place.

When traveling, use steering wheel (1) to turn the machine. With this machine, the front frame is joined to the rear frame at the center of the machine by the center pin. The front and rear frames bend at this point, and the rear wheels follow in the same track as the front wheels when turning. Turn the steering wheel lightly to follow the machine as it turns.

NOTICE

When the steering wheel is turned fully, if it reaches the end of its stroke, do not try to turn it further.

Check that there is a play of 50 to 100 mm ((2.0 to 3.9 in)) in the steering wheel. Check also that the steering works properly. If any abnormality is found, please contact your Komatsu distributor for inspection.



AE061860

EMERGENCY STEERING

! CAUTION

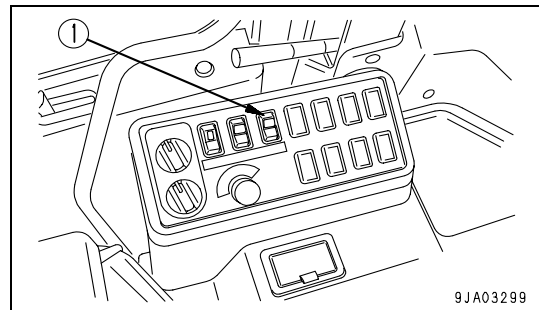
- Never actuate the emergency steering except during emergencies or when checking the function.
- The emergency steering can be used continuously for a maximum of 60 seconds. Operating it continuously for more than 60 seconds may damage the system.
- When using the emergency steering, travel at less than 5 km/h (3.1 MPH).

During emergencies or when stopping the engine to check the function, press emergency steering switch (1). Emergency steering pilot lamp (green) (2) will light up and the steering can be operated.

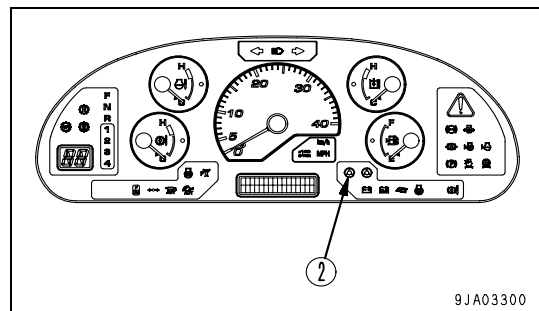
Emergency steering pilot lamp (green) (2) lights up to inform the operator that the emergency steering system has been actuated.

The emergency steering system is provided to enable the machine to be steered under the following conditions.

- The starting switch is at the ON position.



9JA03299



9JA03300

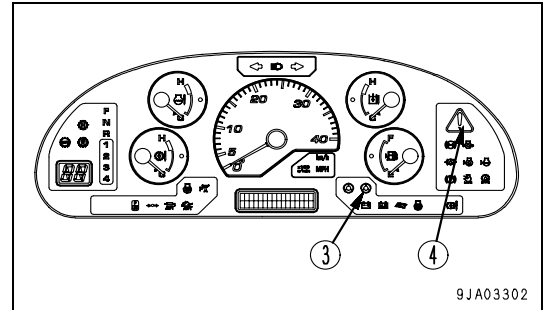
- The steering oil pressure is low or there is no pressure.
(When the engine has stopped or there is a failure in the steering oil pressure pump, etc.)

When the starting switch is turned to the ON position, the emergency steering automatically carries out a self check for 3 seconds. For details, see “EMERGENCY STEERING SELF-CHECK FUNCTION (3-97)”.

When the emergency steering controller detects lack of oil pressure in the steering system, steering oil pressure caution lamp (red) (3) and central warning lamp (4) light up, and the alarm buzzer sounds intermittently.

When this happens, if the machine is traveling at a speed of more than 2 km/h (1.2 MPH), the electric pump motor is automatically actuated and emergency steering pilot lamp (green) (2) lights up.

Steering oil pressure caution lamp (red) (3) lights up to inform the operator that there is a failure in the steering system.



If steering oil pressure caution lamp (red) (3) lights up, move the machine immediately to a safe place and stop it. Locate the cause and do not operate the machine until it has been repaired.

REMARK

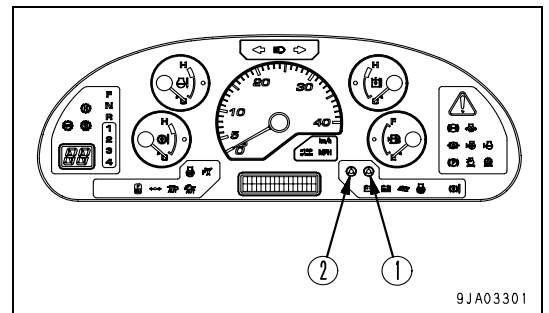
If any function of the oil pressure system is used when the engine is running at low speed, steering oil pressure caution lamp (red) (4) may light up for a moment, but if the lamp goes out again soon, there is no problem.

When the emergency steering controller detects that the oil pressure in the steering circuit has been restored, the actuation of the emergency steering system is stopped.

EMERGENCY STEERING SELF-CHECK FUNCTION

When the starting switch is turned ON, the emergency steering is automatically actuated for approx. 3 seconds to check that the emergency steering is functioning properly.

When this happens, steering oil pressure caution lamp (red) (1) and emergency steering pilot lamp (green) (2) light up.



The emergency steering function check is not carried out in the following cases.

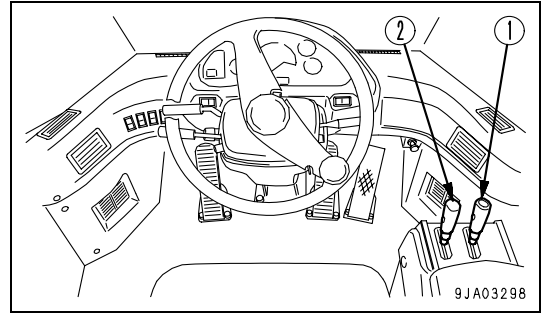
- If the starting switch is turned ON, turned OFF again without starting the engine, and is then turned ON again.
- If the starting switch is turned ON again immediately after stopping the engine when the steering oil pressure has not gone down completely.
- When automatic preheating is being carried out.

WHEN AUTOMATIC PREHEATING IS BEING CARRIED OUT

When automatic preheating is being carried out, the emergency steering self-check function is not actuated. To check the emergency steering function, press the emergency steering switch after completing the warming-up operation.

OPERATION OF WORK EQUIPMENT

Lift arm control lever (1) and bucket control lever (2) can be used to operate the lift arm and bucket as follows.



LIFT ARM OPERATION LEVER

Position (a): RAISE

Position (b): HOLD

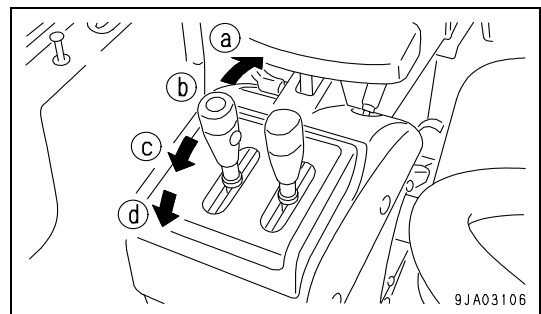
The lift arm is kept in the same position.

Position (c): LOWER

Position (d): FLOAT

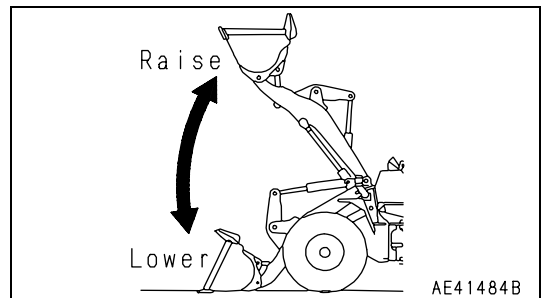
The lift arm moves freely under external force.

When the lift arm control lever is pulled further from the raise position, the lever is stopped in this position until the lift arm reaches the preset kick-out position, and the lever is return to the hold position.



NOTICE

Do not use the FLOAT position when lowering the bucket. Use the FLOAT position when leveling works, see "LEVELING OPERATIONS (3-104)".



BUCKET OPERATION LEVER

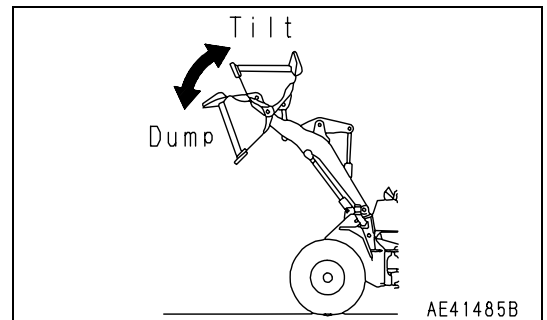
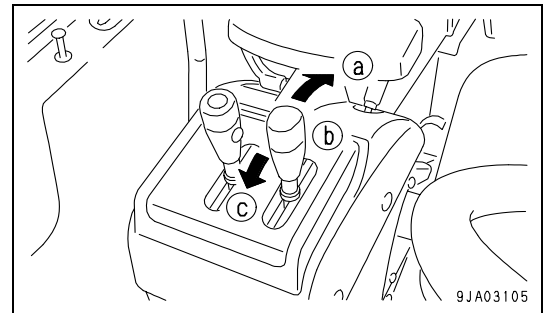
Position (a): TILT

Position (b): HOLD

The bucket is kept in the same position.

Position (c): DUMP

When the bucket control lever is pulled further from the TILT position, the lever is stopped in this position until the bucket reaches the preset position of the positioner, and the lever is returned to the HOLD position.



WORK POSSIBLE USING WHEEL LOADER

In addition to the following, it is possible to further increase the range of applications by using various attachments.

DIGGING OPERATIONS

Semi auto digging is available as an option to control the bucket tilt operation automatically.

⚠ WARNING

- Never carry out digging or scooping operations with the machine articulated. There is danger that the machine may tip over.
- When the machine is traveling or the work equipment is raised, the moment that the travel damper switch is turned ON, the work equipment will move.
- If operations are carried out with the travel damper switch left at the ON position, the moment that the travel damper switch is turned ON, the work equipment will move.

NOTICE

If the tires slip, the tire life will be reduced, so do not allow the tires to slip during operation.

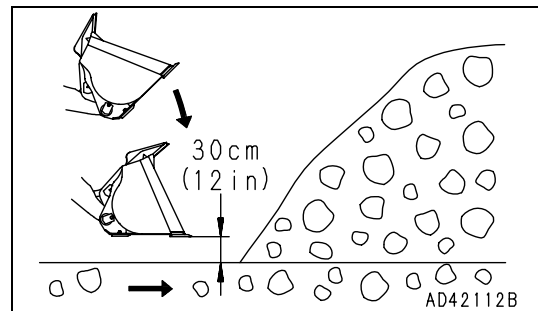
LOADING PILED SOIL OR BLASTED ROCK

- When loading piled soil or blasted rock, drive the machine forward as follows to load. To prevent cutting of the tires caused by the tires slipping, be careful of the following points during the operation.
 - Always keep the operating jobsite flat, and remove any fallen rocks.
 - When working with stockpiles, operate the machine in 1st or 2nd; when loading blasted rock operate the machine in 1st.

1. When driving the machine forward and lowering the bucket, stop the bucket about 30 cm (12 in) from the ground, then lower it slowly.

REMARK

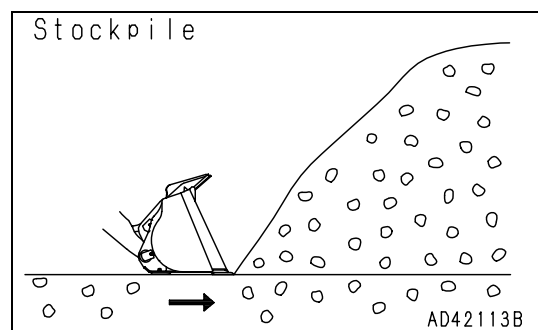
If the bucket hits the ground, the front tires will come off the ground, and the tires will slip.



2. Shift down immediately in front of the material to be loaded. When completing the shift down, depress the accelerator pedal at the same time and thrust the bucket into the load.

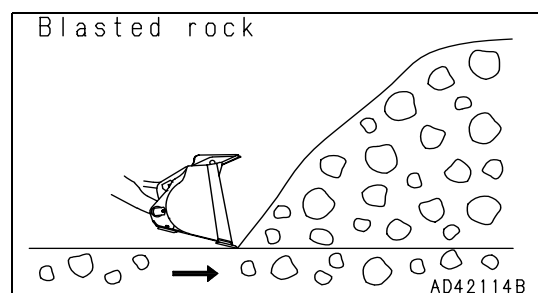
REMARK

To reduce fuel consumption, depress the accelerator pedal the minimum possible amount. If it is depressed fully, the fuel consumption will increase, but there will be no increase in the amount loaded.



3. When the material is in a stockpile, keep the cutting edge of the bucket horizontal; when loading blasted rock, have the bucket tilting slightly down.

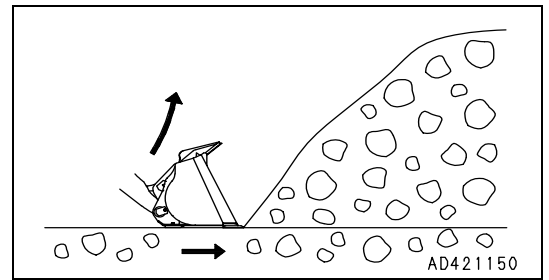
Be careful not to get blasted rock under the bucket. This will make the front tires come off the ground and slip. Try to keep the load in the center of the bucket; if the load is on one side of the bucket, the load will be unbalanced.



- At the same time as thrusting the bucket into the material, raise the lift arm to prevent the bucket from going in too far. By raising the lift arm, ample traction will be produced by the front tires.

REMARK

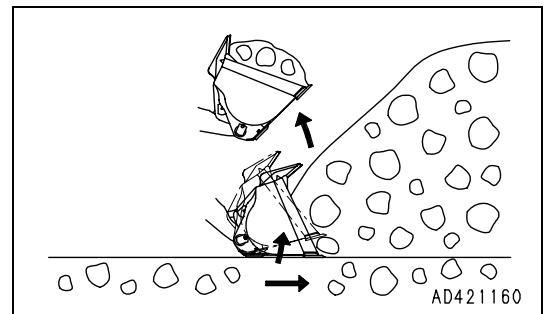
If the bucket is thrust too much and the lift arm stops rising or the machine stops moving forward, release the accelerator pedal a little. Proper operation of the accelerator pedal for each type of the soil is effective for saving of fuel and prevention of wear of the tires.



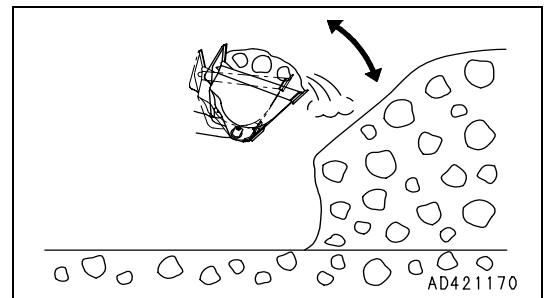
- Check that there is enough material loaded into the bucket, then operate the bucket control lever to tilt the bucket and load the bucket fully.

REMARK

If the bucket edge is moved up and down while pushing in the bucket and digging, the front tires will come off the ground and this will cause the tires to slip.



- If there is too much material loaded in the bucket, dump and tilt the bucket quickly to remove the excessive load. This prevents spillage of the load during hauling.



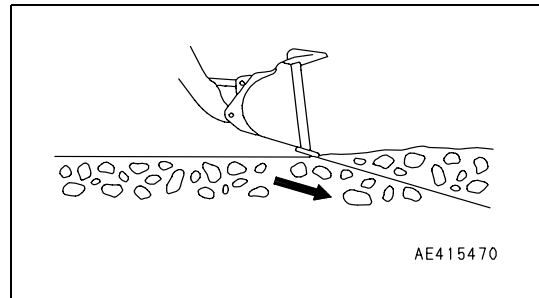
DIGGING AND LOADING ON LEVEL GROUND

- When digging and loading on level ground, set the bucket edge facing down slightly as follows and drive the machine forward. Always be careful not to load the bucket on one side and cause an unbalanced load. This operation should be carried out in 1st gear.

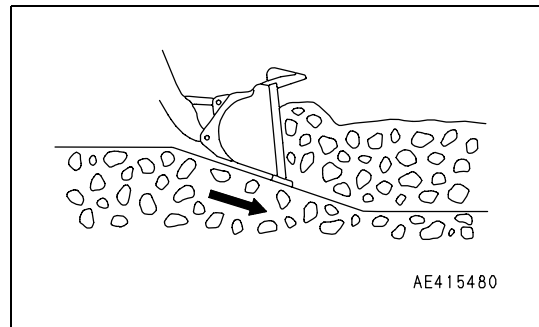

CAUTION

Do not set the bucket facing down more than 20 degrees.

1. Set the edge of the bucket facing slightly down.

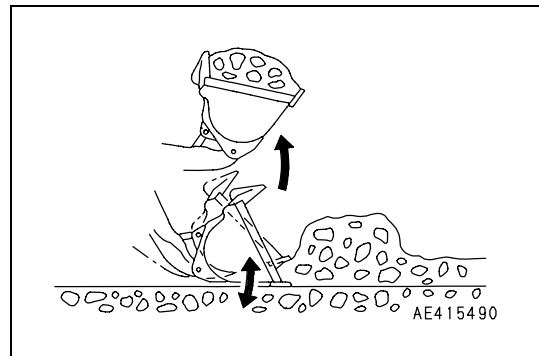


2. Drive the machine forward and operate the lift arm control lever forward to cut a thin layer of the surface each time when excavating the soil.



3. Operate the lift arm control lever slightly up and down to reduce the resistance when driving the machine forward.

When digging with the bucket, avoid imposing the digging force onto only one side of the bucket.



SEMI AUTO DIGGING OPERATIONS

SEMI AUTO DIGGING OPERATIONS

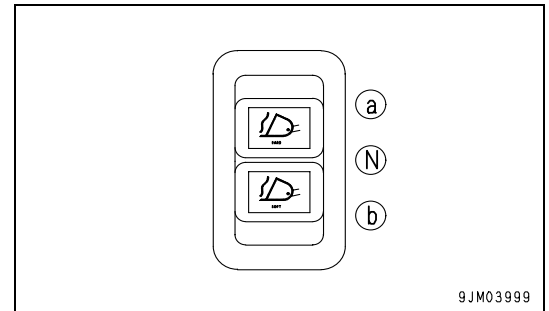
Semi auto digging controls the bucket tilt operation automatically in order to make bucket operations easier for the operator and reduce operator fatigue.

METHOD OF OPERATION

1. Turn the semi auto digging switch on the right switch panel ON (select SOFT or HARD).
When the switch is turned ON, the pilot lamp inside the switch lights up.

REMARK

For details of the selection of SOFT or HARD, see "SELECTING DIGGING PATTERN (3-103)".



2. Lower the bucket to the ground in the same way as for normal digging operations, drive the machine forward, push the bucket into the rock while raising the lift arm to insert the tip of the bucket into the rock, then return the lift arm lever to HOLD, and the bucket will automatically start the tilt operation.

In addition, in digging operations where the lift arm lever is pulled and enters the lift detent, if there is hydraulic stall of the lift arm, the tilt operation will start, and the lift arm RAISE speed will be then held at the most suitable speed.

During automatic digging, the semi auto digging pilot lamp on the main monitor lights up.

SELECTING DIGGING PATTERN

The following 2 modes can be selected for operating the bucket tilt.

- The semi auto digging switch on the right switch panel is used to select the mode.

(1) SOFT mode

This mode is effective when handling crushed rock or other light load materials.

The bucket tilt actuation is controlled continuously.

(2) HARD mode

This mode is effective when handling heavy load materials.

The bucket tilt actuation is controlled intermittently.

MANUAL OPERATION DURING AUTOMATIC CONTROL

It is possible to operate the tilt or dump lever during automatic operation of the bucket tilt.

The amount of operation of the lever is added to the bucket speed being controlled by the system.

END OF CONTROL

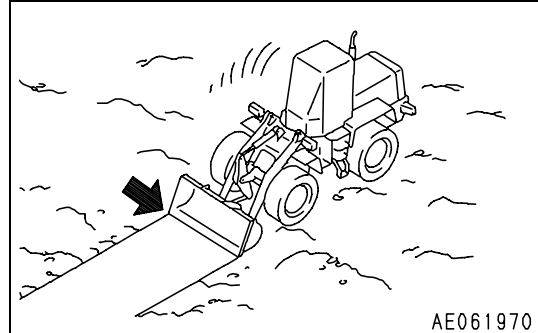
When the bucket reaches the end of the tilt, the control ends.

LEVELING OPERATIONS

NOTICE

- Always operate the machine in reverse when carrying out leveling operations.
- If it is necessary to carry out leveling operations when traveling forward, do not set the bucket dumping angle to more than 20 degrees.
- Turn the E.C.S.S. OFF carrying out leveling operations.

1. Scoop soil into the bucket. Move the machine backward while spreading soil from the bucket little by little.
2. Go over the spread soil with the bucket teeth touching the ground and level the ground by back-dragging.
3. Scoop some more soil into the bucket, put the lift arm in float, level the bucket at ground level, and smooth the ground by moving backward.



PUSHING OPERATION

⚠ CAUTION

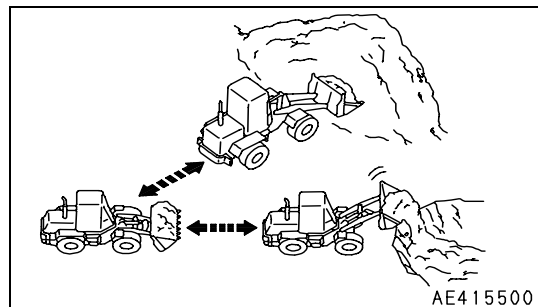
Never set the bucket to the DUMP position when carrying out pushing operation.

When carrying out pushing operations, set the bottom of the bucket parallel to the ground surface.

LOAD AND CARRY OPERATIONS

⚠ WARNING

- When carrying a load, lower the bucket to lower the center of gravity when traveling.
- Always stop the machine and lower the work equipment to the ground before operating the E.C.S.S. switch.
- When carrying out inspection and maintenance, first lower the work equipment to the ground, then turn the E.C.S.S. switch OFF before starting the inspection and maintenance operation.



The load and carry method for wheel loaders consists of a cycle of scooping -

Always keep the travel path properly maintained.

When using the load and carry method, see "PRECAUTIONS WHEN LOAD AND CARRY METHOD (3-116)".

LOADING OPERATIONS

Select the method of operation which will give the minimum amount of turning and travel in order to provide the most efficient method for the jobsite.

WARNING

- Always keep the jobsite flat, and do not operate the steering wheel suddenly or apply the brakes suddenly when the lift arm is raised with a loaded bucket. This is dangerous.
- Never thrust the bucket in when traveling at high speed (when loading soil or crushed rock). This is dangerous.
- When the machine is traveling or the work equipment is raised, the moment that the travel damper switch is turned ON, the work equipment will move.
- If operations are carried out with the travel damper switch left at the ON position, the moment that the travel damper is actuated, the work equipment will move.

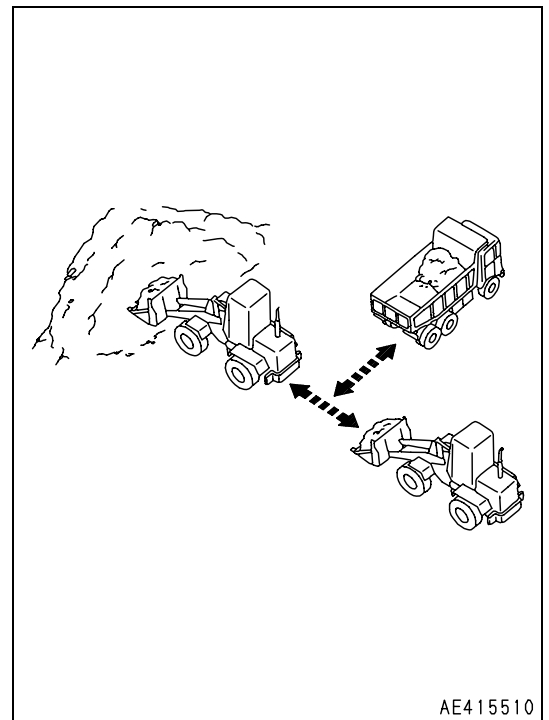
NOTICE

- If the tires slip, the tire life will be reduced, so do not allow the tires to slip during operation.
- Avoid excessive shaking of the bucket.

CROSS DRIVE LOADING

Always set the wheel loader facing at a right angle to the stockpile. After digging in and scooping up the load, drive the machine straight back in reverse, then bring the dump truck in between the stock pile and the wheel loader.

This method requires the least time for loading, and is extremely effective in reducing the cycle time.

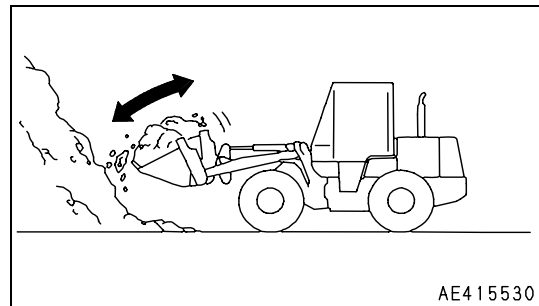
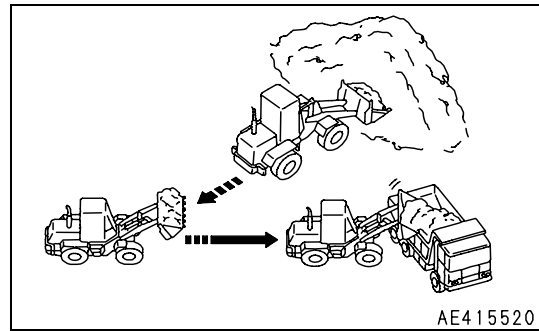


V-SHAPE LOADING

Position the dump truck so that the direction of approach of the wheel loader is approx. 60 degrees from the direction of approach to the stockpile. After loading the bucket, drive the wheel loader in reverse, then turn it to face the dump truck and travel forward to load the dump truck.

The smaller the turning angle of the wheel loader is, the more efficient the operation becomes.

When loading a full bucket and raising it to the maximum height, first shake the bucket to stabilize the load before raising the bucket. This will prevent the load from spilling to the rear.



PRECAUTIONS WHEN PILING UP LOADS

When forming products into a pile, be careful not to let the rear counterweight come into contact with the ground. Do not set the bucket to the DUMP position when carrying out piling-up operations.

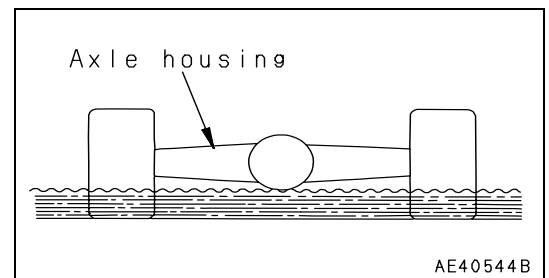
REMARK

- When carrying out scooping-up work, avoid using the transmission cut-off function as far as possible. It will prevent the machine from moving back.
- When using the transmission cut-off function, adjust the cut-off position to match the amount that the brake pedal is depressed in order to ensure ample braking force.

PRECAUTIONS FOR OPERATION

PERMISSIBLE WATER DEPTH

When working in water or on swampy ground, do not let the water come above the bottom of the axle housing. After finishing the operation, wash and check the lubricating points.



IF WHEEL BRAKE DOES NOT WORK

If the machine is not stopped by depressing the brake pedal, use the parking brake to stop the machine.

NOTICE

If the parking brake has been used as an emergency brake, contact your Komatsu distributor to have the parking brake checked for any abnormality.

PRECAUTIONS WHEN DRIVING UP OR DOWN SLOPES

LOWER THE CENTER OF GRAVITY WHEN TURNING.

When turning on slopes, lower the work equipment to lower the center of gravity before turning. It is dangerous to turn the machine suddenly on slopes.

BREAKING ON DOWNHILL SLOPE

If the service brake is used frequently when traveling downhill, the brake will overheat and may be damaged. Place the gearshift lever at a low speed range and use the braking force of the engine when traveling downhill. Use the right brake pedal for braking.

If the brakes are used excessively, the axle oil temperature caution lamp may light up and the alarm buzzer may sound intermittently. For details of the necessary action to take, see "AXLE OIL TEMPERATURE CAUTION LAMP (3-17)" in EXPLANATION OF COMPONENTS.

If the speed range selected by the gearshift lever is not correct, the torque converter oil may overheat. If this happens, shift down one gear range and reduce the oil temperature.

If the oil temperature does not return to the white range even when the gearshift lever is at 1st, stop the machine, return the directional lever to the N position, and run the engine at a mid-range speed until the gauge returns to the white range.

IF ENGINE STOPS

If the engine stops on a slope, apply the parking brake immediately, and lower the work equipment to the ground and stop the machine. Then put the directional lever in neutral position, and start the engine again.

PRECAUTIONS WHEN DRIVING MACHINE

When the machine travels at high speed for a long distance, the tires become extremely hot. This causes early wear of the tires, so it should be avoided as far as possible. If the machine must be driven for a long distance, take the following precautions.

- Follow the regulations related to this machine, and drive carefully.
- Before driving the machine, carry out the checks before starting.
- The most suitable tire pressure, travel speed, or tire type differ according to the condition of the travel surface. Contact your Komatsu distributor or tire dealer for information.
- The following is a guide to suitable tire pressures and speeds when traveling on a paved surface with standard tires. (23.5-25-20PR)
Tire pressure
Front wheel: 0.39 MPa (4.0 kgf/cm², 56.8 PSI)
Rear wheel: 0.31 MPa (3.2 kgf/cm², 45.4 PSI)
Speed: 14 km/h (8.7 MPH)
- Check the tire pressure before starting, when the tire is cool.
- After traveling for 1 hour, stop for 30 minutes. Check the tires and other parts for damage; also check the oil and coolant levels.
- Always travel with the bucket empty.
- Never put "calcium chloride" or "dry ballast" in the tires when traveling.

PRECAUTIONS REGARDING BRAKE FUNCTION

When traveling long distances continuously downhill, the frequency of using the brake may increase. As a result, depending on the weight of the machine and the grade of the slope, the machine's braking capacity may be exceeded and the brakes may overheat.

The table below shows a guideline of the values for this machine.

Machine weight (t)	Slope grade (%)	Braking capacity limit	
		Average travel speed limit (km/h (MPH))	Downhill distance limit (continuous) ^A (km)
22 - 24 (unloaded)	10	40 (24.9)	2
	20	17 (10.6)	1.2
28.5 - 30.5 (loaded)	10	30 (18.6)	1.8
	20	12 (7.5)	0.6

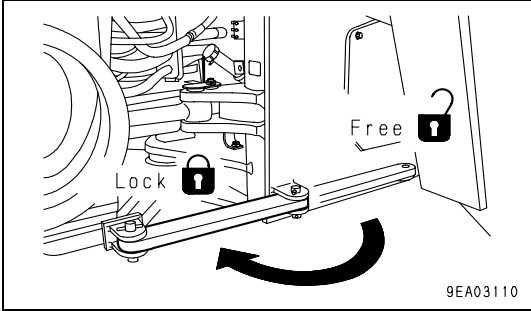
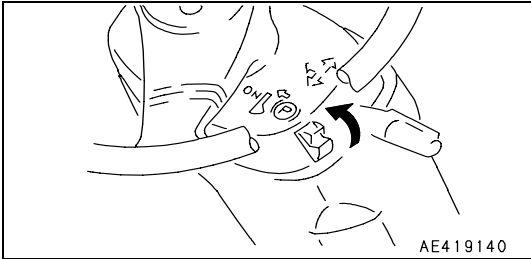
If the braking capacity limit is exceeded, a forced cooling system for the brakes is needed, so please consult your Komatsu distributor.

ADJUSTING WORK EQUIPMENT POSTURE

WARNING

- Stop the machine on flat ground and put blocks in front and behind the wheels.
- Apply the parking brake.
- Secure the front and rear frames with the safety bar.
- Always attach the warning tag to the work equipment control lever.
- Do not go under the work equipment when the arm is raised.

The boom kickout makes it possible to set the bucket so that it automatically stops at the desired lifting height (lift arm higher than horizontal) and the bucket positioner makes it possible to set the bucket so that it automatically stops at the desired digging angle. The setting can be adjusted to match the working conditions.

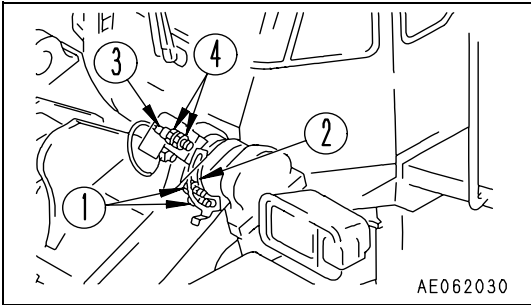


ADJUSTING BOOM KICKOUT

1. Raise the bucket to the desired height, set the lift arm control lever at HOLD and lock the lever in position. Then stop the engine and adjust as follows.
2. Loosen two bolts (1), and adjust plate (2) so that the bottom edge is in line with the center of the sensing surface of proximity switch (3). Then tighten the bolts to hold the plate in position.
3. Loosen two nuts (4) to make a clearance of 3 to 5 mm ((0.118 to 0.197 in) between plate (2) and the sensing surface of proximity switch (3). Then tighten the nuts to hold in position.

Tightening torque: $17.2 \pm 2.5 \text{ N}^2\text{m}$ ($1.75 \pm 0.25 \text{ kgf}^2\text{m}$, $12.7 \pm 1.8 \text{ lbf}^2\text{ft}$)

4. After adjusting, start the engine and operate the lift arm control lever. Check that the lever is automatically returned to HOLD when the bucket reaches the desired height.



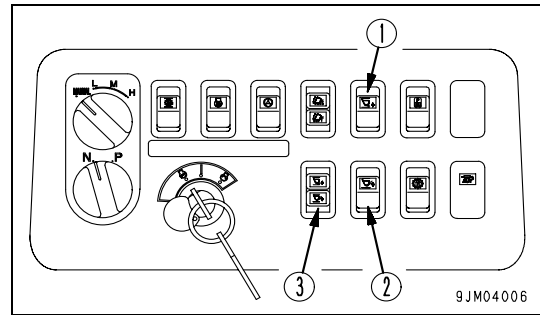
METHOD OF REMOTE POSITIONER

(If equipped)

It is possible to set the lift arm stop position by operating remote positioner RAISE mode switch (1), remote positioner LOWER mode switch (2), and remote positioner RAISE/LOWER set switch (3) on the right switch panel.

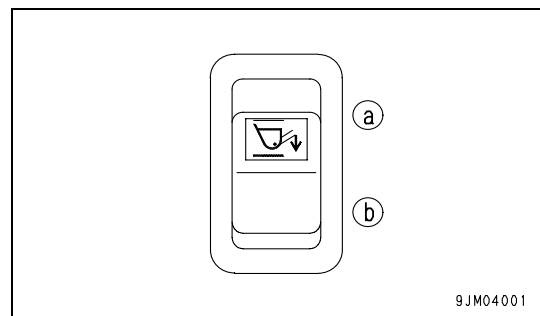
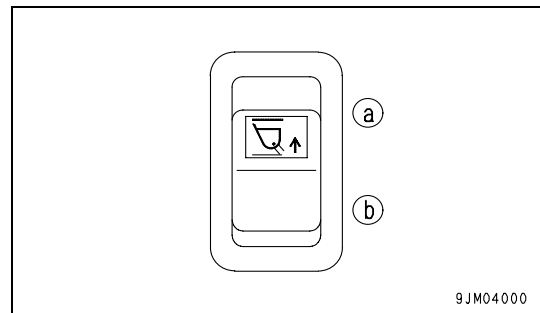
REMARK

The RAISE mode is used when setting the lift arm position at a point where the lift arm is above the horizontal position; the LOWER mode is used when setting the stop position at a point where the lift arm is below the horizontal position.



● Setting with RAISE (or LOWER) mode

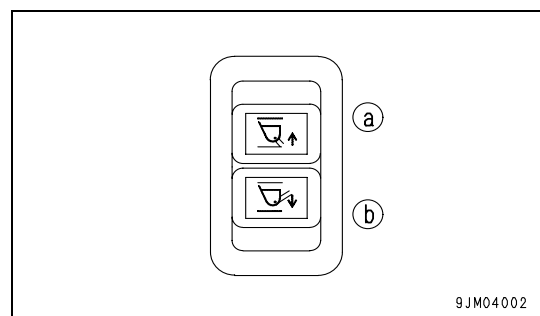
1. Press the top (a) of remote positioner RAISE (or LOWER) mode switch (1) (or (2)) to turn the mode ON.
2. Raise (or lower) the bucket to the desired position.



3. In the case of the RAISE mode, press the top (a) (or the bottom (b) for the LOWER mode) of remote positioner RAISE/LOWER set switch (3).
The lift arm stop position is set.

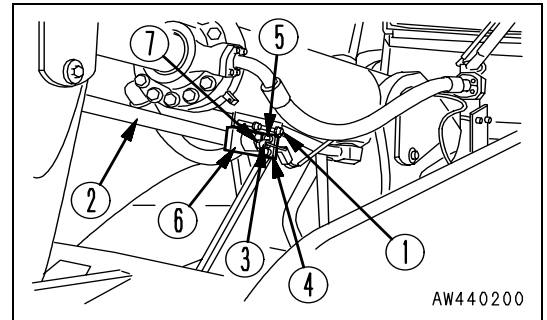
If the setting is carried out properly, the buzzer will give short sounds.

If the setting cannot be carried out, the buzzer gives a long sound, so repeat the procedure from Step 1.



ADJUSTING BUCKET POSITIONER

1. Lower the bucket to the ground, set to the desired digging angle, return the bucket control lever to the HOLD position, then lock the work equipment control lever with the safety lock lever and stop the engine.
2. Loosen 2 bolts (1), adjust the position of mounting bracket (4) of the proximity switch so that the rear tip of bar (2) is in line with the center of the sensing surface of proximity switch (3), then tighten bolts to hold the bracket in position.
3. Loosen 2 bolts (5), adjust so that the clearance between bar (2) and support (6) is 0.5 to 2 mm ((0.020 to 0.079 in)), then tighten bolts (5) to hold in position.
4. Loosen 2 nuts (7), adjust so that the clearance between bar (2) and the sensing surface of proximity switch (3) is 3 to 5 mm ((0.118 to 0.197 in)), then tighten the nuts to hold in position.
Tightening torque: $17.2 \pm 2.5 \text{ N}^2\text{m}$ ($1.75 \pm 0.25 \text{ kgf}^2\text{m}$, $12.7 \pm 1.8 \text{ lbf}^2\text{ft}$)
5. After adjusting, start the engine and raise the lift arm. Operate the bucket control lever to the DUMP position, then operate it to the TILT BACK position and check that the lever is automatically returned to the HOLD position when the bucket reaches the desired digging angle.

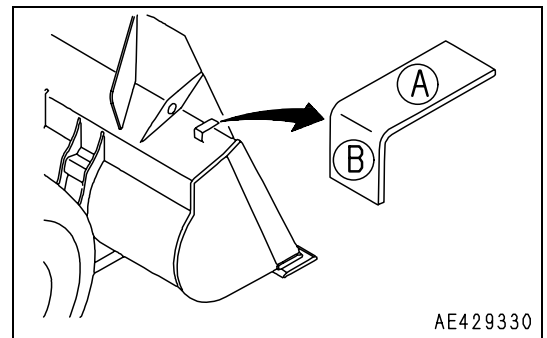


BUCKET LEVEL INDICATOR

(A) and (B) at the top rear of the bucket are the level indicators, so the bucket angle can be checked during operations.

(A): Parallel with cutting edge

(B): 90 degrees to cutting edge



PARKING MACHINE

WARNING

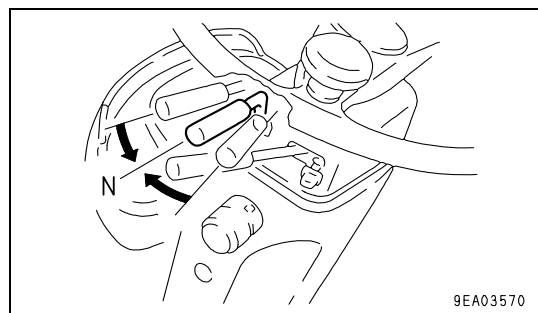
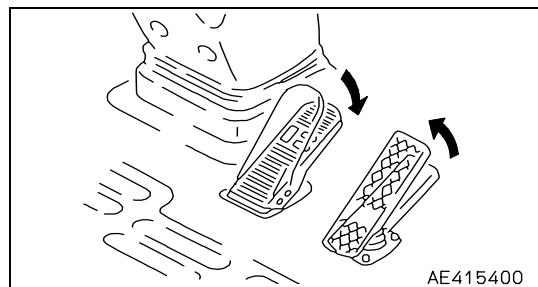
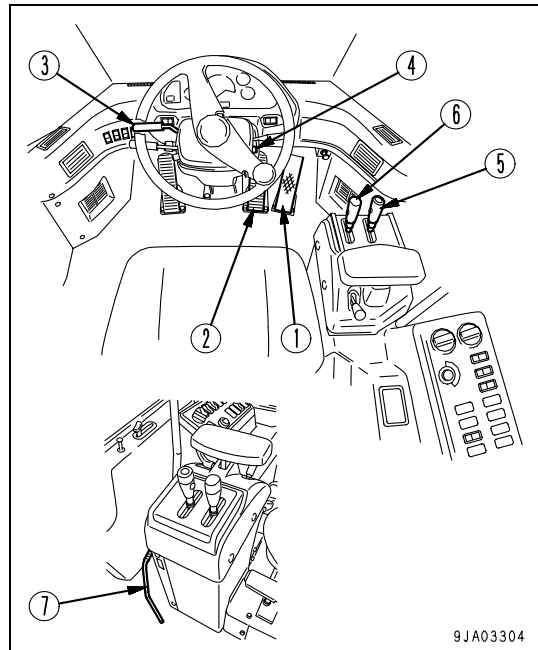
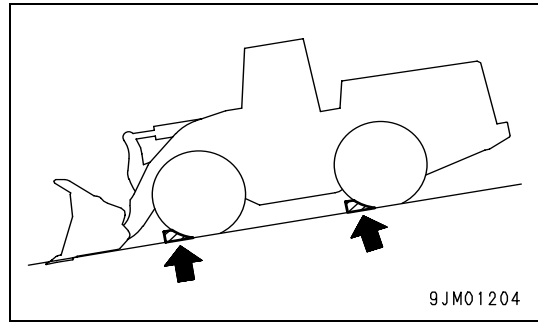
- Avoid stopping suddenly. Give yourself ample room when stopping.
- Do not park the machine on slopes.
- If the machine has to be parked on a slope, set it facing directly down the slope, then dig the bucket into the ground and put blocks under the tires to prevent the machine from moving.
- If the control lever is touched by accident, the work equipment or the machine may move suddenly, and this may lead to a serious accident. Before leaving the operator's compartment, always set the safety lock lever securely to the LOCK position.
- Even if the parking brake switch is turned ON, there is danger until the parking brake pilot lamp lights up, so keep the brake pedal depressed.

NOTICE

Never use the parking brake switch to brake the machine when traveling except in an emergency. Apply the parking brake only after the machine has stopped.

1. Release accelerator pedal (1), then depress brake pedal (2) to stop the machine.

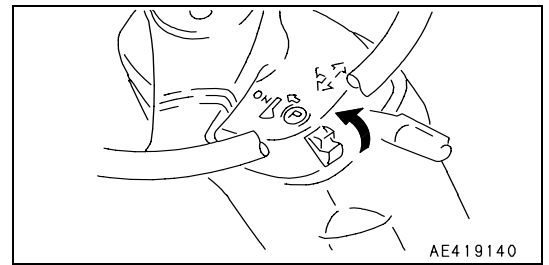
2. Place directional lever (3) in N (neutral) position.



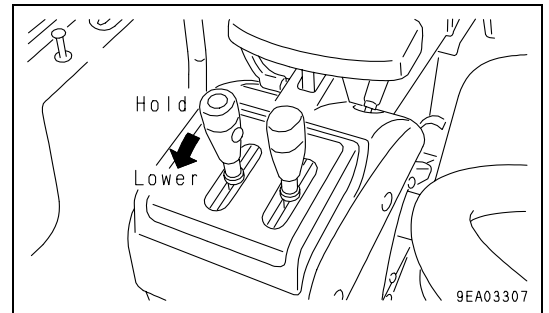
- Turn parking brake switch (4) to ON to apply the parking brake.

NOTICE

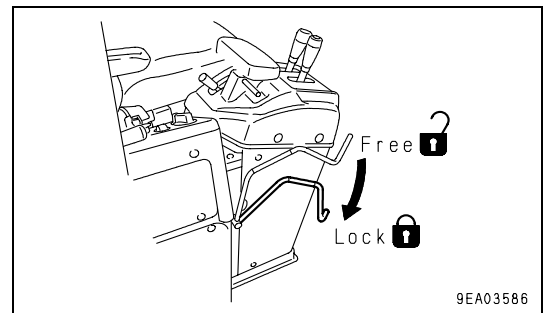
When the parking brake is applied, the transmission is automatically returned to neutral.



- Operate lift arm control lever (5) to lower the bucket to the ground.



- Lock lift arm control lever (5) and bucket control lever (6) with safety lock (7).



CHECKS AFTER COMPLETION OF OPERATION

Check the engine water temperature, engine oil pressure, torque converter oil temperature, and fuel level with the machine monitor.

If the engine has overheated, do not stop it suddenly. Run the engine at a midrange speed to allow the engine to cool down before stopping it.

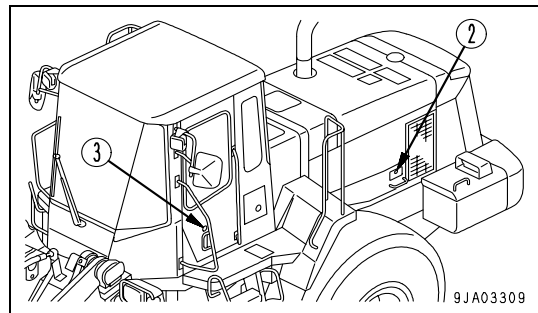
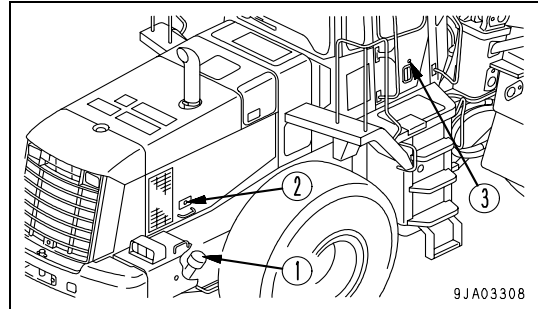
LOCKING

Always lock the following parts.

- (1) Fuel tank filler cap
- (2) Engine side panel (2 points)
- (3) Cab door (2 points)

REMARK

The starting switch key is used also for locks (1), (2), and (3).



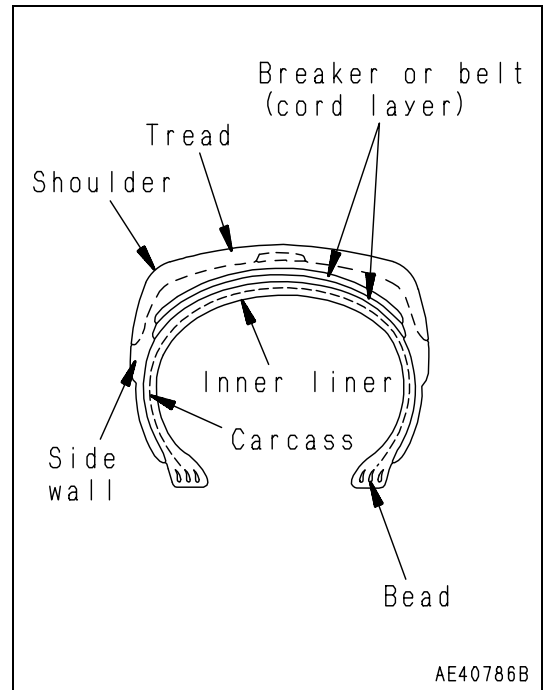
HANDLING THE TIRES

PRECAUTIONS WHEN HANDLING TIRES

CAUTION

If a tire has reached any of the following service limits, there is danger that the tire may burst or cause an accident, so to ensure safety, replace it with a new tire.

- **Service limits for wear**
When the remaining depth of the groove on construction equipment tires (at a point approx. 1/4 of the tread width) is 15% of the groove depth on a new tire.
- **When the tire shows marked uneven wear, stepped wear or other abnormal wear, or when the cord layer is exposed.**
- **Service limits for damage**
When there is external damage extending to the cord or when the cord is broken
When the cord is cut or there is dragging
When the tire is peeling (there is separation)
When the bead is damaged
- **For tubeless tires, when there is air leakage or improper repair**



AE40786B

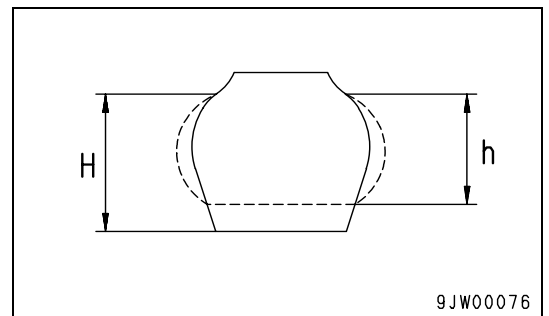
Please contact your Komatsu distributor when replacing the tires. It is dangerous to jack up the machine without taking due care.

TIRE PRESSURE

Measure the tire pressure before starting operations, when the tires are cool.

If the tire inflation pressure is too low, there will be overload; if it is too high, it will cause tire cuts and shock burst. To prevent these problems, adjust the tire inflation pressure according to the table on the next page.

$$\text{Deflection ratio} = \frac{H - h}{H} \times 100$$



9JW00076

As a guideline that can be checked visibly, the deflection ratio of the front tire (deflection/free height) is as follows.

- When carrying normal load (lift arm horizontal): Approx. 15 to 25 %
- When digging (rear wheels off ground): Approx. 25 to 35 %

When checking the tire inflation pressure, check also for small scratches or peeling of the tire, for nails or pieces of metal which may cause punctures, and for any abnormal wear.

Clearing fallen stones and rocks from the operating area and maintaining the surface will extend the tire life and give improved economy.

For operations on normal road surfaces, rock digging operations: High end of range in air pressure chart

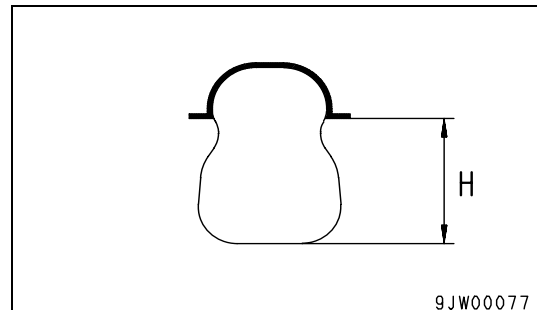
Stockpile operations on soft ground: Average pressure in air pressure chart

Operations on sand (operations not using much digging force): Low end of range in air pressure chart

If the deflection of the tire is excessive, raise the inflation pressure within the limits given in the table to give a suitable deflection (see deflection ratio).

Tire size (Pattern)	H Free height (mm)	Inflation pressure [MPa (kgf/cm ² , PSI)]			When shipped from factory
		Soft ground (sandy ground)	Normal road		
		Stockpile	Stockpile	Digging	
23.5-25-20PR (L3 RockÅj Standard)	424 (BS) 423 (TOYO)	0.24 to 0.35 (2.4 to 3.6, 34.1 to 36.9)	0.26 to 0.35 (2.6 to 3.6, 36.9 to 51.1)	0.26 to 0.35 (2.6 to 3.6, 36.9 to 51.1)	Front tire: 0.39 (4.0, 56.8) Rear tire: 0.31 (3.2, 45.4)
26.5-25-16PR (L3 RockÅj if equipped)	492 (BS)	Front tire: 0.34 (3.5, 45.4)	Front tire: 0.34 (3.5, 45.4)	Front tire: 0.34 (3.5, 45.4)	Front tire: 0.34 (3.5, 45.4)
26.5-25-20PR (L3 RockÅj if equipped)		Rear tire: 0.29 (3.0, 42.6)	Rear tire: 0.29 (3.0, 42.6)	Rear tire: 0.29 (3.0, 42.6)	Rear tire: 0.29 (3.0, 42.6)

Stockpile operations mean the loading of sand and other loose materials.



PRECAUTIONS WHEN LOAD AND CARRY METHOD

When traveling continuously with load and carry operations, choose the correct tires to match the operating conditions, or choose the operating conditions to match the tires. If this is not done, the tires will be damaged, so contact your Komatsu distributor or tire dealer when selecting tires.

TRANSPORTATION

When transporting the machine, observe all related laws and regulations, and be careful to assure safety.

TRANSPORTATION PROCEDURE

As a basic rule, always transport the machine on a trailer.

When selecting the trailer, see the weights and dimensions given in Section "TECHNICAL DATA (5-2)".

Note that the specifications for the weights and dimensions for transportation differ according to the type of tires and type of bucket.

LOADING, UNLOADING WORK WITH TRAILERS

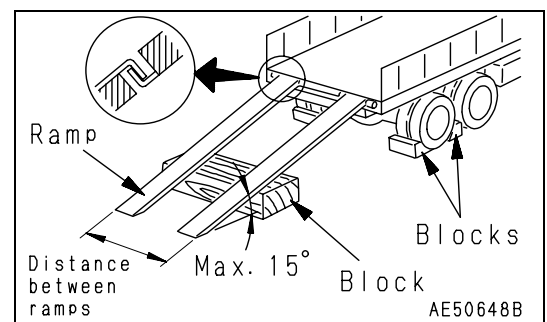
WARNING

- When loading or unloading the machine, run the engine at low speed, travel at low speed, and operate slowly.
- When loading or unloading the machine, stop the trailer on firm level ground.
- In addition, keep well away from the road shoulder.
- Use ramps of ample width, length, thickness, and strength, and install them securely at an angle of less than 15°.
- When using an embankment, compact the fill soil thoroughly and make sure that the slope face does not collapse.
- Remove the mud stuck to the undercarriage to prevent the machine from slipping to the side on the ramps.
- In addition, remove any water, snow, ice, grease, or oil from the ramps.
- Never change direction on the ramps. There is danger that the machine may tip over.
- If it is necessary to change direction, return to the ground surface or the trailer platform, correct the direction, and start again.
- The position of the center of gravity of the machine will change suddenly at the connection of the ramp and trailer, and there is danger of the machine losing its balance. Always drive slowly over this point.

When loading or unloading, always use ramps or a platform and carry out the operation as follows.

LOADING

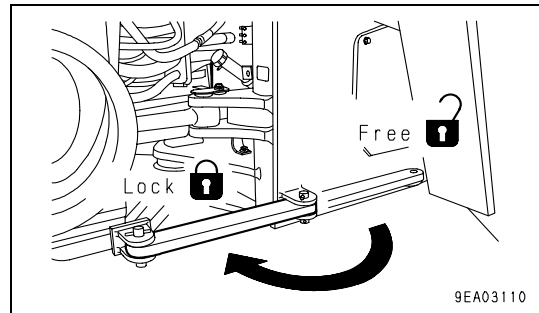
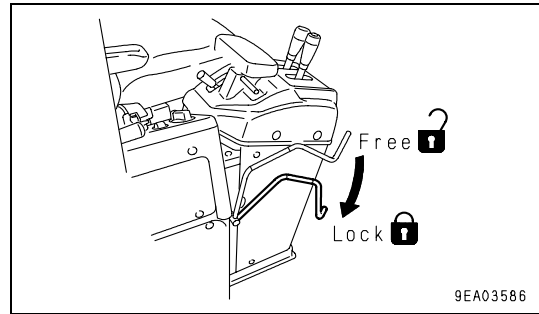
1. Perform loading and unloading on firm, level ground only.
Maintain a safe distance from the edge of a road.
2. Apply the brakes on the trailer securely and insert blocks under the tires to ensure that the trailer does not move.
Then fix the ramps in line with the centers of the trailer and the machine.
Be sure that the two sides are at the same height as one another.
Make the angle of the ramps a maximum of 15°.
Set the distance between the ramps to match the center of the tires.
If the ramp sags appreciably, reinforce it with blocks, etc.
3. Determine the direction of the ramp, then slowly load the machine.
4. Load the machine correctly in the specified position on the trailer.



SECURING MACHINE

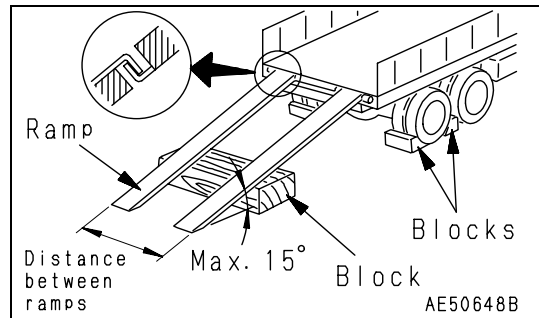
Load the machine on to a trailer as follows.

1. Lower the blade slowly.
2. Apply the safety lock to lock all the control levers securely.
3. Turn the starting switch to the OFF position to stop the engine, and pull out the starting switch key.
4. Lock front frame and rear frame with safety bar.
5. Put blocks in front and behind the wheels, and secure the machine with chains or wire rope to prevent the machine from moving during transportation.
In particular, fix the machine securely to prevent it from slipping sideways.
6. Always retract the car radio (if equipped) antenna fully.

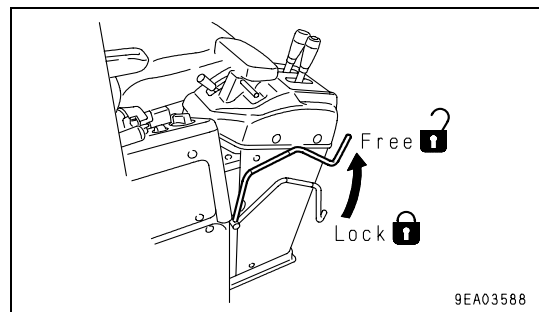


UNLOADING

1. Perform loading and unloading on firm, level ground only. Maintain a safe distance from the edge of a road.
2. Apply the brakes on the trailer securely and insert blocks under the tires to ensure that the trailer does not move.
Then fix the ramps in line with the centers of the trailer and the machine.
Be sure that the two sides are at the same height as one another.
Make the angle of the ramps a maximum of 15°.
Set the distance between the ramps to match the center of the tires.
If the ramp sags appreciably, reinforce it with blocks, etc.



3. Remove the chains or wire rope holding the machine.
4. Start the engine.
Warm the engine up fully.
5. Set the safety lock lever to the FREE position.
6. Determine the direction of the ramps, then drive the machine slowly down the ramps to unload the machine.



LIFTING MACHINE



WARNING

- When lifting the machine, if the wire rope is not fitted correctly the machine may fall and cause serious injury or even death. Raise the machine 100 to 200 mm ((3.9 to 7.9 in)) from the ground, check that the machine is horizontal and that there is no slack in the wire rope, then continue to lift the machine.
- Before lifting the machine, always stop the engine and lock the brakes. Lock front frame and rear frame with safety bar.
- Lifting operations using a crane must be carried out by a qualified operator.
- Never raise the machine with any worker on it.
- Always make sure that the wire rope used for lifting the machine is of ample strength for the weight of the machine.
- Never try to lift the machine at any position or in any posture other than the posture specified.
- Never go under the machine when it is raised.



CAUTION

When the machine is raised, check that there is no leakage of oil from the hydraulic circuits of the machine.

When carrying out the lifting operation, please contact your Komatsu distributor.

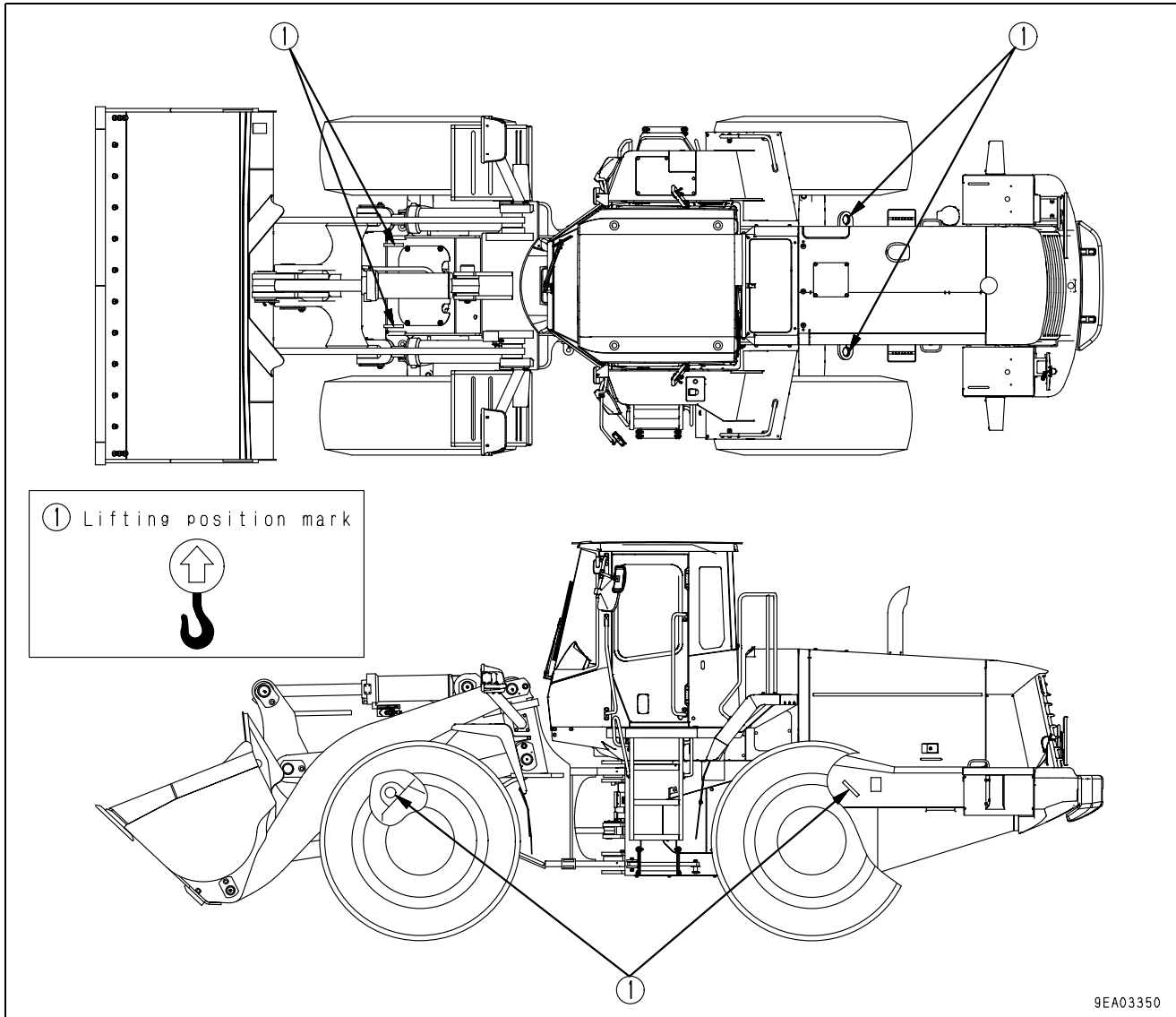
NOTICE

The lifting procedure applies to machines with standard specifications.

The method of lifting differs according to the attachments and options actually installed. In such cases, please contact your Komatsu distributor for information.

For details of the weight, see "WEIGHT TABLE (3-120)"

POSITION FOR STICKING LIFTING POSITION MARK



9EA03350

WEIGHT TABLE

	Operating weight	Front wheel load	Rear wheel load	Center of gravity (from front axle)
WA470-5H standard specification machine	22,880 kg (50396 lb)	10,900 kg (24009 lb)	11,980 kg (26388 lb)	1,810 mm (5 ft 11 in)

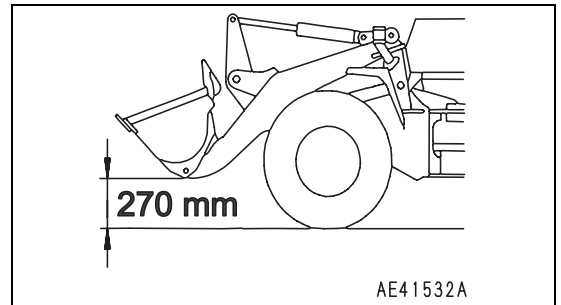
LIFTING PROCEDURE

⚠ CAUTION

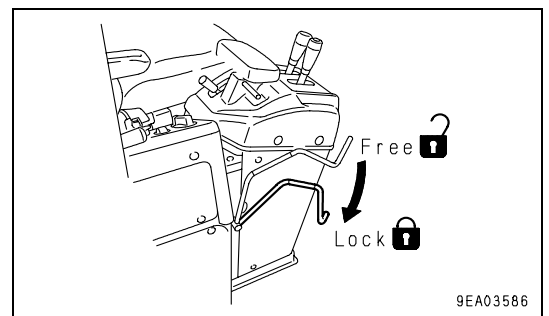
When the machine is raised, check that there is no leakage of oil from the hydraulic circuits of the machine.
 When carrying out the lifting operation, please contact your Komatsu distributor.

Lifting work can be carried out only for machines with lifting marks. Before starting the lifting operation, stop the machine in a horizontal place and do as follows.

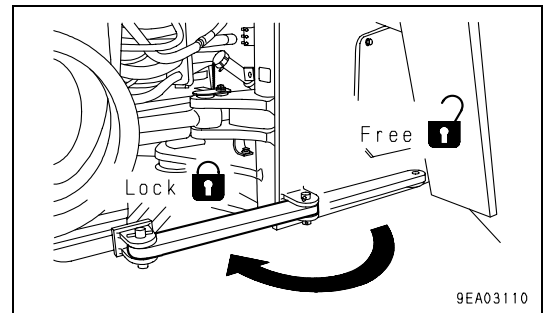
1. Start the engine, make sure that the machine is horizontal, then set the work equipment to the travel posture. For details, see "PREPARATIONS FOR MOVING MACHINE (3-87)".



2. Move the work equipment safety lock lever to the LOCK position.



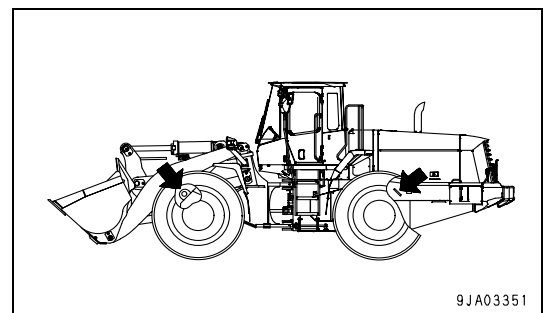
3. Stop the engine, check that the area around the operator's compartment is safe, then lock with the safety bar so that the front frame and rear frame do not articulate.



4. Fit the lifting equipment to the lifting hooks (marked by the lifting mark) at the front of the front frame and the rear of the rear frame.

For machines equipped with a rear full fender, remove the rear full fender before carrying out the operation.

5. When the machine leaves the ground, stop for a moment and wait for the machine to stabilize, then continue the lifting operation slowly.



COLD WEATHER OPERATION

PRECAUTIONS FOR LOW TEMPERATURE

If the temperature becomes low, it becomes difficult to start the engine, and the coolant may freeze, so do as follows.

FUEL AND LUBRICANTS

Change to fuel and oil with low viscosity for all components. For details of the specified viscosity, see "LUBRICANTS AND OPERATING MEANS (4-8)".

COOLANT

WARNING

- Antifreeze is toxic. Be careful not to get it into your eyes or on your skin. If it should get into your eyes or on your skin, wash it off with large quantities of fresh water and see a doctor at once.
- Antifreeze is toxic. Be extremely careful when handling it. When replacing coolant containing antifreeze or when handling coolant when repairing the radiator, contact your Komatsu distributor or ask your local antifreeze dealer. Be careful not to let the water flow into drainage ditches or spray on to the ground surface.
- Antifreeze is flammable, so do not bring any flame close. Do not smoke when handling antifreeze.

NOTICE

- Never use methanol, ethanol or propanol based antifreeze.
- Absolutely avoid using any water leak preventing agent irrespective of weather it is used independently or mixed with an antifreeze.
- Do not mix one antifreeze with a different brand.

For details of the antifreeze mixture when changing the coolant, see "CLEAN INSIDE OF COOLING SYSTEM (4-21)".

Use a Permanent Antifreeze (ethylene glycol mixed with corrosion inhibitor, antifoam agent, etc.) meeting the standard requirements as shown below. With permanent antifreeze, no change of coolant is required for a year. If it is doubtful that an available antifreeze meets the standard requirements, ask the supplier of that antifreeze for information.

Standard requirements for permanent antifreeze

- SAE J1034
- FEDERAL STANDARD O-A-548D

REMARK

In areas where permanent antifreeze is not available, it is possible to use antifreeze whose main component is ethylene glycol and does not contain any corrosion inhibitor. (Such antifreeze can be used for the winter season only.) However, in such a case, the cooling water must be changed twice a year (spring and fall), so use permanent antifreeze as far as possible.

BATTERY

 **WARNING**

- The battery generates flammable gas, so do not bring fire or sparks near the battery.
- Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amounts of water, and consult a doctor.
- Battery electrolyte dissolves paint. If it gets on to the bodywork, wash it off immediately with water.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is danger that the battery may explode.

When the ambient temperature drops, the capacity of the battery will also drop. If the battery charge ratio is low, the battery electrolyte may freeze. Maintain the battery charge as close as possible to 100%, and insulate it against cold temperature so that the machine can be started easily the next morning.

REMARK

Measure the specific gravity and calculate the rate of charge from the following conversion table.

Temperature (°C)s Charging Rate(%)	20	0	-10	-20
100	1.28	1.29	1.30	1.31
90	1.26	1.27	1.28	1.29
80	1.24	1.25	1.26	1.27
75	1.23	1.24	1.25	1.26

- As the battery capacity drops markedly in low temperatures, cover the battery or remove it from the machine, keep it in a warm place, and install it again the next morning.
- If the electrolyte level is low, add distilled water in the morning before beginning work. Do not add the water after the day's work so as to prevent fluid in the battery from freezing in the night.

PRECAUTIONS AFTER COMPLETION OF WORK

To prevent mud, water, or the undercarriage from freezing and making it impossible for the machine to move on the following morning, always observe the following precautions.

- Mud and water on the machine body should be completely removed. This is to prevent damage to the seal caused by mud or dirt getting inside the seal with frozen drops of water.
- Park the machine on hard, dry ground.
If this is impossible, park the machine on wooden boards.
The boards help protect the tracks from being frozen in soil and the machine can start next morning.
- Open the drain valve and drain any water collected in the fuel system to prevent it from freezing.

AFTER COLD WEATHER

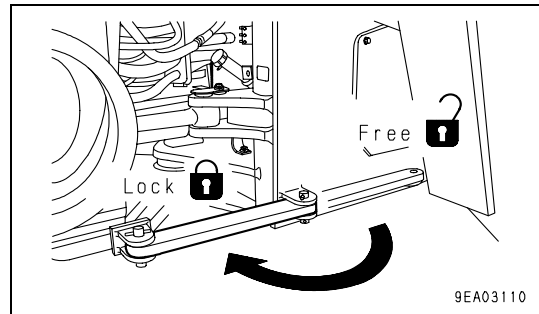
When season changes and the weather becomes warmer, do as follows.

- Replace the fuel and oil for all parts with oil of the viscosity specified.
For details, see "LUBRICANTS AND OPERATING MEANS (4-8)".
- If for any reason permanent antifreeze cannot be used, and an ethyl glycol base antifreeze (winter, one season type) is used instead, or if no antifreeze is used, drain the cooling system completely, then clean out the inside of the cooling system thoroughly, and fill with fresh soft water.

WARMING-UP OPERATION FOR STEERING HYDRAURIC CIRCUIT IN COLD WEATHER

WARNING

If the steering lever is operated and stopped while the oil temperature is low, there may be a time lag before the machine stops turning.
 In this case, use the safety bar to ensure safety, and perform the warm-up operation in a wide place.
 Do not relieve the hydraulic oil in the circuit continuously for more than 5 seconds.



When the temperature is low, do not start the operation of the machine immediately after starting the engine.

Warming up steering hydraulic circuit

Slowly operate the steering lever to the left and right to warm up the oil in the steering valve. (Repeat this operation for about 10 minutes to warm up the oil.)

NOTICE

Operate the steering lever a little and stop in that position. Then, confirm that the machine is being steered by an angle equivalent to the amount that the steering lever is operated

RECOMMENDED OIL

Change oil according to the following table, depending on an ambient temperature.

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE									
		-22 30	-4 -20	14 -10	32 0	50 10	68 20	86 30	104 40	122°F 50°C	
Hydraulic system	Engine oil	SAE 10WCD									
		SAE 5W-20CD									

If SAE5W-20CD is used in the cold season, replace it with SAE10WCD after

LONG-TERM STORAGE

BEFORE STORAGE

When putting the machine in storage for a long time, do as follows.

- Clean and wash all parts, then store the machine indoors. If the machine has to be stored outdoors, select level ground and cover the machine with a sheet.
- Completely fill the fuel tank, lubricate and change the oil before storage.
- Apply a thin coat of grease to the metal surface of the hydraulic piston rods.
- Disconnect the negative terminals of the battery and cover it or remove it from the machine and store it separately.
- If the ambient temperature is expected to drop below 0°C (32°F), add antifreeze to the cooling water. Since Komatsu genuine super coolant (AF-ACL) is added normally, it may be unnecessary to change when the temperature is above -10°C (14°F). If it drops below 10°C (14°F), see "CLEAN INSIDE OF COOLING SYSTEM (4-21)" for the adjustment of concentration ratio.
- Lock each control lever and pedal with the lock lever and pedal lock.

DURING STORAGE



WARNING

If it is unavoidably necessary to carry out the rust-preventive operation while the machine is indoors, open the doors and windows to improve ventilation and prevent gas poisoning.

- During storage, always operate the machine once a month so that a new film of oil will be coated over movable parts and component surfaces. At the same time, also charge the battery.
- When operating the work equipment, wipe off all the grease from the hydraulic cylinder rod.
- If the machine is equipped with an airconditioner, operate it for 3 to 5 minutes once a month to lubricate each portion of its compressor. Be sure to idle the engine at low speed for this purpose. Also, check the quantity of refrigerant twice a year.

AFTER STORAGE

NOTICE

If the machine is to be used when the monthly rust prevention operation has not been carried out, please contact your Komatsu distributor.

When using the machine after long-term storage, do as follows before using it.

- Wipe off the grease from the hydraulic cylinder rods.
- Add oil and grease to all places.
- When a machine is stored for a long period, moisture in the air will get into the oil. Check the oil before and after starting the engine. If there is water in the oil, change the oil.

TROUBLESHOOTING

WHEN MACHINE RUNS OUT OF FUEL

When starting the engine after running out of fuel, fill the fuel tank with fuel, then fill the fuel strainer and fuel filter cartridge with clean fuel and bleed the air from the fuel system.

Always watch the fuel level and be careful not to run out of fuel.

If the engine has stopped because of lack of fuel, it is necessary to use the priming pump to bleed the air completely from the fuel circuit.

PROCEDURE FOR BLEEDING AIR

CAUTION

- This engine consists of higher precision parts than on the conventional fuel injection pump and nozzle, so if dirt gets in, it will cause problems. If there is any dirt stuck to the fuel line, use fuel to wash it off completely.
- Be careful when opening the air bleed plug at the fuel filter head and the air bleeder of the supply pump. The system is still under pressure and fuel may spurt out.

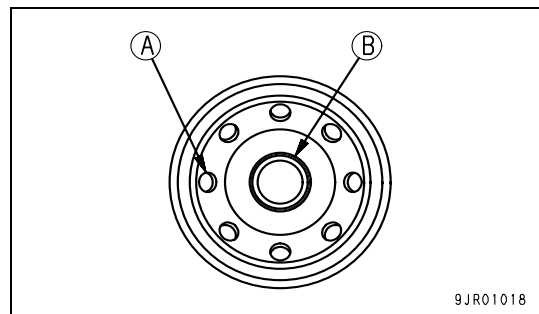
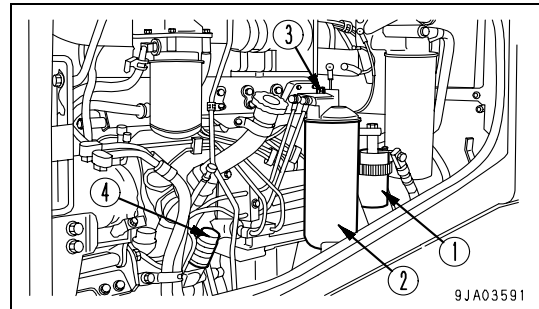
1. Remove fuel strainer (1), fill the inside of the strainer with clean fuel, taking care not to let dirt or dust get in, then install it again.

2. Remove fuel filter cartridge (2), fill the inside of the filter with clean fuel, taking care not to let dirt or dust get in, then install it again.

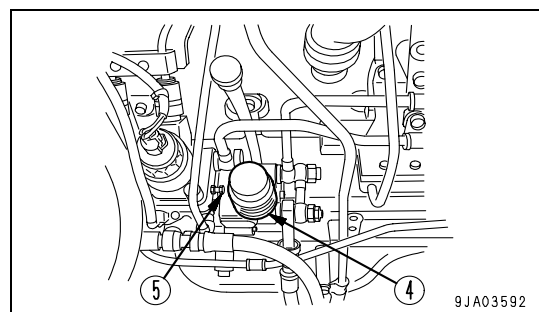
Add fuel from small hole (A) (dirty side) at eight places. Do not add fuel from hole (B) (clean side) at the center.

If clean fuel is not available, go on to Step 3.

3. Loosen air bleed plug (3) at the fuel filter head.
4. Loosen the knob of priming pump (4), then pump the knob until no more bubbles come out of air bleed plug (3).
5. Tighten air bleed plug (3).
Tightening torque: 7.8 to 9.8 N²m (0.8 to 1 kgf²m, 5.8 to 7.2 lbf²)



6. Loosen air bleeder (5) of the supply pump.
7. Pump priming pump (4) approx. 90 - 100 times until no more bubbles come out with the fuel from air bleeder (5), then tighten air bleeder (4).
Tightening torque: 4.9 to 6.9 N²m (0.5 to 0.7 kgf²m, 3.6 to 5.1 lbf²)



8. Continue pumping (approx. 50 times) until the priming pump (4) becomes stiff and the overflow valve release sound becomes continuous.

9. Push in the knob of priming pump (4) and tighten it.
10. Turn the key in the starting switch to the START position and start the engine.
When doing this, do not crank the starting motor continuously for more than 20 seconds. If the engine does not start, wait for at least 2 minutes, then try again. Perform this operation a maximum of 4 times.
11. If the engine does not start, repeat the operation from Step 3.

TOWING THE MACHINE

WARNING

- Check that the wire rope is of ample strength for the weight of the machine being towed.
- Do not apply a load to the wire rope suddenly.
- If there is a failure in the brake line, the brakes cannot be used, so be extremely careful when towing.

NOTICE

- Towing is for moving the machine to a place where inspection and maintenance can be carried out, and not for moving it long distances.
- The machine must not be towed for long distances.
- For details of the procedure for towing a machine when it has broken down, please contact your Komatsu distributor.

This machine must not be towed except in emergencies. When towing the machine, take the following precautions.

- When releasing the brakes, put blocks under the wheels to prevent the machine from moving. If the wheels are not blocked, the machine may suddenly move.
- When towing a machine, tow it at a low speed of less than 2 km/h (1.2 MPH), and for a distance of a few meters to a place where repairs can be carried out. The machine should be towed only in emergencies. If the machine must be moved long distances, use a transporter.
- To protect the operator if the towing rope or bar should break, install a protector plate to the machine being towed.
- If it is impossible to operate the steering and brakes of the machine being towed, do not let anyone ride on the machine.
- Check that the tow rope or bar is of ample strength for the weight of the machine being towed. If the machine being towed must travel through mud or up hills, use a tow rope or bar of a strength of at least 1.5 times the weight of the machine being towed.
- Keep the angle of the tow rope as small as possible. Keep the angle between the center lines of the two machines to within 30 degrees.
- If the machine is moved suddenly, the tow rope or bar will be subjected to an excessive load, and it may break. Start the machine gradually and travel at a constant speed.
- The towing machine should normally be of the same class as the machine being towed. Check that the towing machine has ample braking power, weight, and rimpull to allow it to control both machine on slopes or on the tow road.
- When towing a machine downhill, use a larger machine for towing to provide ample rimpull and braking power, or connect another machine to the rear of the machine being towed. In this way it is possible to prevent the machine from losing control and turning over.
- Towing may be carried out under various differing conditions, so it is impossible to determine beforehand the requirements for towing. Towing on flat horizontal roads will require the minimum rimpull, while towing on slopes or on uneven road surfaces will require the maximum rimpull.

WHEN ENGINE CAN BE USED

- If the transmission and steering wheel can be operated, and the engine is running, it is possible to tow the machine out of mud or to move it for a short distance to the edge of the road.
- The operator should sit on the machine being towed and operate the steering in the direction that the machine is towed.

WHEN ENGINE CANNOT BE USED

When towing a machine with the engine stopped, use the following procedure.

1. The transmission oil does not lubricate the system, so remove the front and rear drive shafts. If necessary, block the tires to prevent the machine from moving.
2. The steering cannot be operated, so remove the steering cylinder.
Even if the brakes are in good condition, the brakes can only be used a limited number of times. There is no change in the operating force for the brake pedal, but the braking force is reduced each time the pedal is depressed.
3. Connect the towing equipment securely. When carrying out towing operations, use two machines of at least the same class as the machine being towed. Connect one machine each to the front and rear of the machine being towed, then remove the blocks from the tires and tow the machine.
4. Parking brake
The parking brake cannot be turned OFF. To release the parking brake, do as follows.

RELEASING PARKING BRAKE

WARNING

- When releasing the parking brake, stop the machine on level ground and check that the surrounding area is safe. If it is necessary to release the brake on a slope in an emergency, block the tires before starting the operation.
- If the parking brake is released, the brake cannot be used, so check the safety carefully when moving the machine.

If the engine will not run for some reason, use the following methods to release the parking brake and tow the machine.

METHOD OF RELEASING PARKING BRAKE WITH EMERGENCY PARKING BRAKE RELEASE VALVE

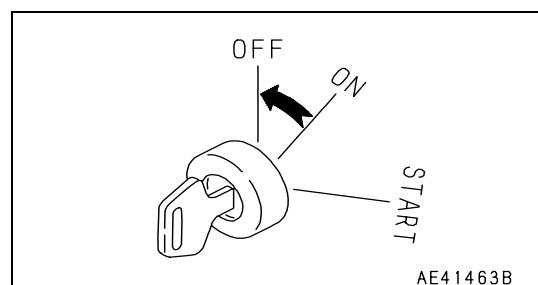
CAUTION

When the parking brake switch is at the OFF position and the emergency parking brake release valve is opened, the parking brake is released immediately.

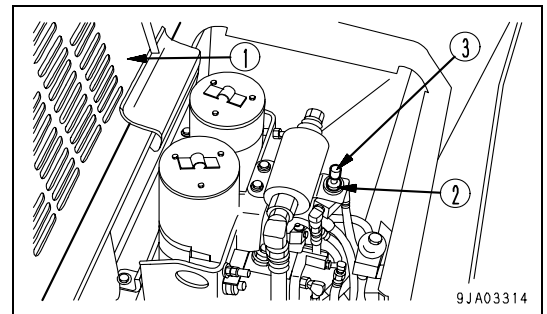
In this condition, even if you feel danger and try to stop the machine, the parking brake will not be applied immediately even if you close the emergency parking brake release valve.

If the pressure in the brake accumulator is high, do as follows.

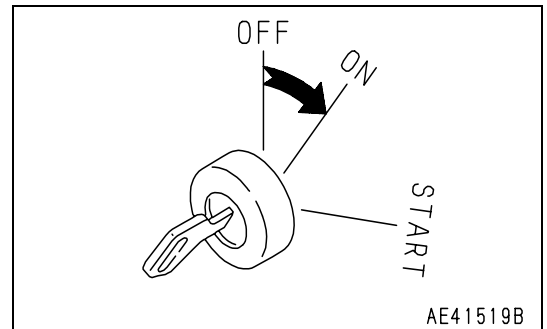
1. Turn the starting switch to the OFF position.



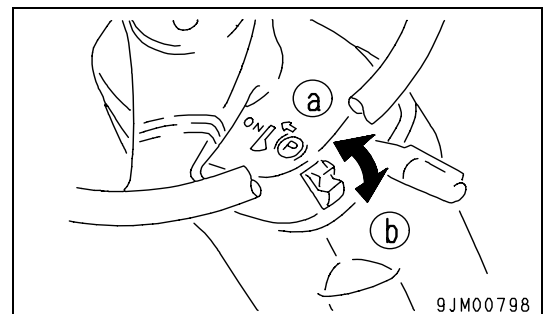
2. Open cover (1) on the cab side of the engine hood.
3. Turn locknut (2) of the release valve counterclockwise to loosen it, then turn grip (3) counterclockwise and open the release valve.



4. Turn the starting switch ON.



5. Move the parking brake switch to the ON (a) position (actuated), then move it to the OFF (b) position (released). The parking brake is released.



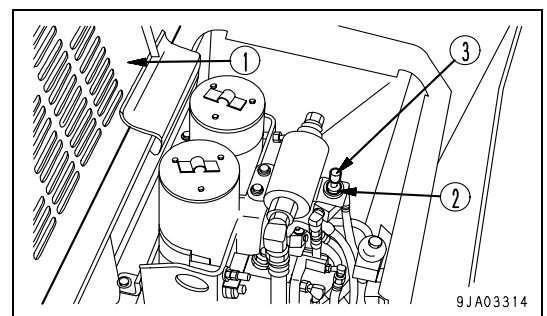
6. To restore the function of the parking brake, turn grip (3) of the release valve clockwise to close the release valve, then turn locknut (2) clockwise to lock it.

Tightening torque

Grip (3): $25 \pm 5 \text{ N}^2\text{m}$ ($2.5 \pm 0.5 \text{ kgf}^2\text{m}$, $18.1 \pm 3.6 \text{ lbft}$)

Locknut (2): $20 \pm 5 \text{ N}^2\text{m}$ ($2.0 \pm 0.5 \text{ kgf}^2\text{m}$, $14.5 \pm 3.6 \text{ lbft}$)

7. Move the parking brake switch to the ON (a) position. The parking brake is applied.
To release the parking brake again, repeat the procedure in Steps 1 to 5.

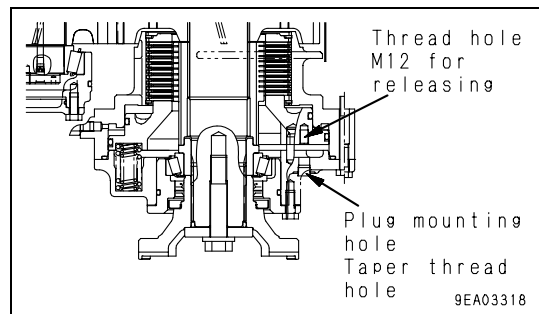
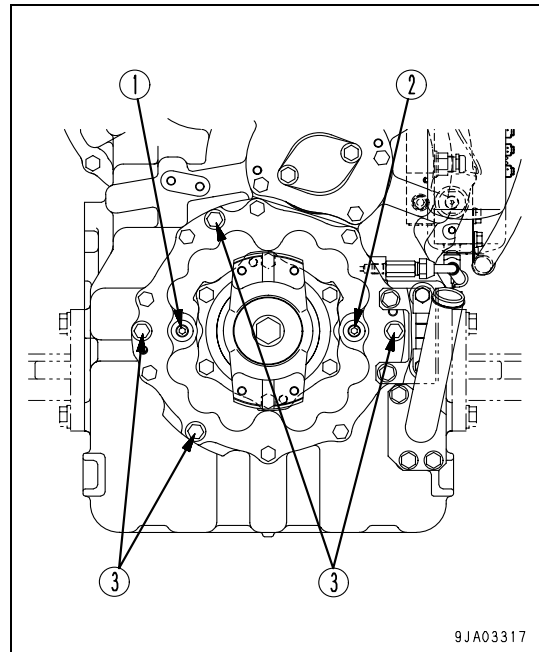


REMARK

If the brake accumulator pressure is low, the parking brake warning lamp may not go out, or the alarm buzzer may sound continuously. If this happens, go to the following section “METHOD OF RELEASING MECHANICALLY (3-130)“ and release the brake.

METHOD OF RELEASING MECHANICALLY

1. Remove plugs (1) and (2) at the front of the transmission case.
2. Of the bolts installing the parking brake chamber, 4 bolts (3) have a high (3 mm (0.118 in)) mounting seat. Remove 2 of bolts (3).
3. Screw bolts (3) into the holes from which plugs (1) and (2) were removed and tighten uniformly until they stop.
4. This releases the parking brake.

**EMERGENCY TRAVEL OPERATION**

The normal gear shifting operation is carried out by electric signals. If there should be a failure in the electrical system and the machine does not move, please contact your Komatsu distributor to have the machine moved.

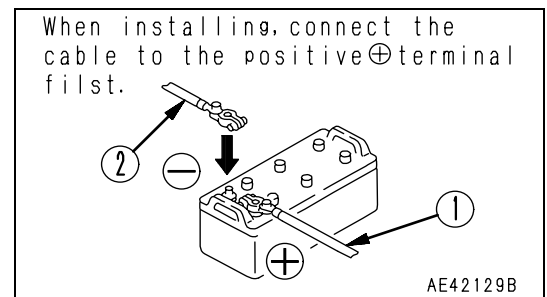
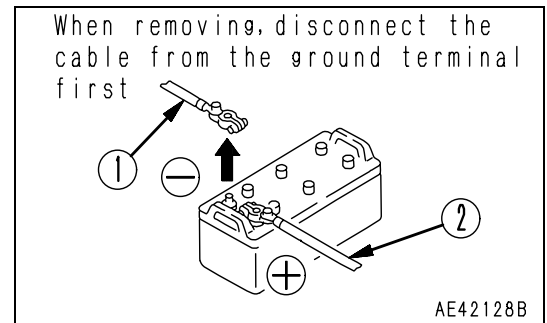
NOTICE

Always request your Komatsu distributor to carry out the emergency travel operation.

IF BATTERY IS DISCHARGED

⚠ WARNING

- When checking or handling the battery, stop the engine and turn the starting switch key to the OFF position.
- The battery generates hydrogen gas, so there is a hazard of explosion. Do not bring lighted cigarettes near the battery, or do anything that will cause sparks.
- Battery electrolyte is dilute sulphuric acid, and it will attack your clothes and skin. If it gets on your clothes or on your skin, wash it immediately off with large amounts of water. If it gets in your eyes, wash it out with fresh water, and consult a doctor.
- When handling batteries, always wear protective goggles and rubber gloves.
- When removing the battery, first disconnect the cable from the ground (normally the negative (-) terminal). When installing, install the positive (+) terminal first.
- If a tool touches the positive terminal and the chassis, there is danger that it will cause a spark, so be extremely careful.
- If the terminals are loose, there is danger that the defective contact may generate sparks that will cause an explosion.
- When removing or installing the terminals, check which is the positive (+) terminal and which is the negative (-) terminal.
- Green rust around the terminals is a cause of self-discharge of the battery. Polish the terminals with sandpaper. After removing the rust, coat the terminals thinly with grease before installing.



REMOVAL AND INSTALLATION OF BATTERY

1. Before removing battery, remove the ground cable (normally connected to the negative (-) terminal). If any tool touches between the positive terminal and the chassis, there is danger of sparks being generated. Loosen the terminal and remove the wires from the battery.
Tightening torque: 2 to 2.9 N²m
(0.2 to 0.3 kgf²m, 1.4 to 2.2 lbft)
2. After installing the battery, fix it with the battery fitting securely.
Tightening torque: 5.88 to 9.81N²m
(0.6 to 1.0kgf²m, 4.3 to 7.2 lbft)
3. When install the battery, connect the ground cable last.
Insert the hole of the terminal on the battery and tighten the nut.
Tightening torque: 5.88 to 9.81N²m
(0.6 to 1.0kgf²m, 4.3 to 7.2 lbft)

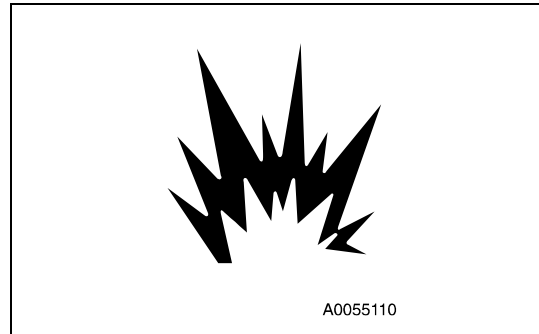
REMARK

The batteries are on both sides at the rear of the machine. The battery used for the ground is on the left side of the machine.

PRECAUTIONS FOR CHARGING BATTERY

When charging the battery, if the battery is not handled correctly, there is danger that the battery may explode. Always follow the instructions in "BATTERY (3-123)" and the instruction manual accompanying the charger, and do as follows.

- Do not use or charge the battery if the battery electrolyte level is below the LOWER LEVEL line. This may cause an explosion. Always check the battery electrolyte level periodically and add distilled water to bring the electrolyte level to the UPPER LEVEL line.
- Set the voltage of the charger to match the voltage of the battery to be charged. If the voltage is not selected correctly, the charger may overheat and cause an explosion.
- Connect the positive (+) charger clip of the charger to the positive (+) terminal of the battery, then connect the negative (-) charger clip of the charger to the negative (-) terminal of the battery. Be sure to fix the clips securely.
- Set the charging current to 1/10 of the value of the rated battery capacity; when carrying out rapid charging, set it to less than the rated battery capacity.
If the charger current is too high, the electrolyte will leak or dry up, and this may cause the battery to catch fire and explode.
- If the battery electrolyte is frozen, do not charge the battery or start the engine with a different power source. There is a hazard that this will ignite the battery electrolyte and cause the battery to explode.



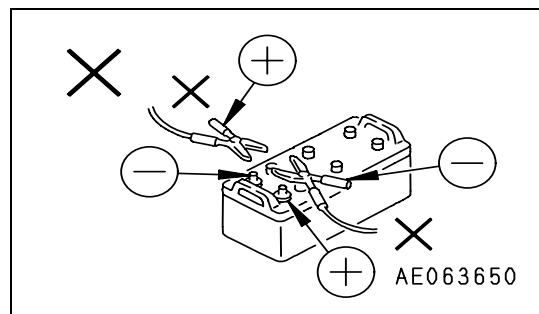
STARTING ENGINE WITH BOOSTER CABLE

When starting the engine with a booster cable, do as follows:

PRECAUTIONS WHEN CONNECTING AND DISCONNECTING BOOSTER CABLE

WARNING

- When connecting the cables, never contact the positive (+) and negative (-) terminals.
- When starting the engine with a booster cable, always wear safety glasses and rubber gloves.
- Be careful not to let the normal machine and problem machine contact each other. This prevents sparks from generating near the battery which could ignite the hydrogen gas given off by the battery.
- Make sure that there is no mistake in the booster cable connections. The final connection is to the engine block of the problem machine, but sparks will be generated when this is done, so connect to a place as far as possible from the battery.
- When disconnecting the booster cable, take care not to bring the clips in contact with each other or with the machine body.



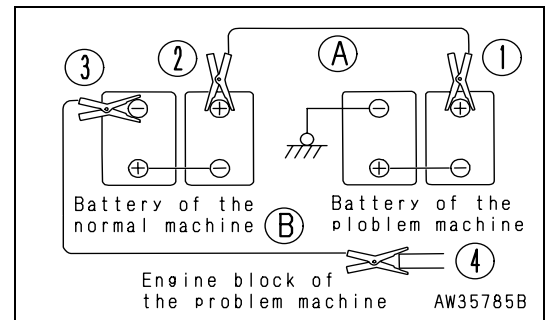
NOTICE

- The size of the booster cable and clip should be suitable for the battery size.
- The battery of the normal machine must be the same capacity as that of the engine to be started.
- Check the cables and clips for damage or corrosion.
- Make sure that the cables and clips are firmly connected.
- Check that the safety lock levers and parking brake levers of both machines are in the LOCK position.
- Check that each lever is in the NEUTRAL position.

CONNECTING THE BOOSTER CABLE

Keep the starting switch of the normal machine and problem machine are both at the OFF position. Connect the booster cable as follows, in the order of the numbers marked in the diagram.

1. Connect one clip of booster cable (A) to the positive (+) terminal of the problem machine.
2. Connect the other clip of booster cable (A) to the positive (+) terminal of the normal machine.
3. Connect one clip of booster cable (B) to the negative (-) terminal of the normal machine.
4. Connect the other clip of booster cable (B) to the engine block of the problem machine.



STARING ENGINE

⚠ CAUTION

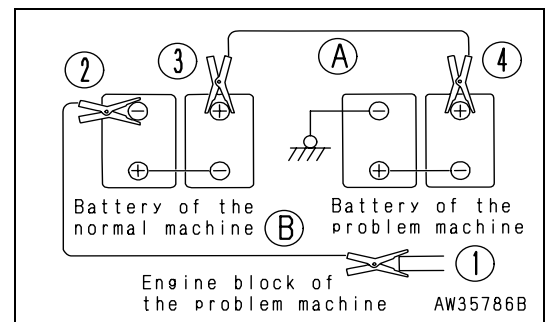
Always check that the safety lock lever is set to the LOCK position, regardless of whether the machine is working normally or has failed. Check also that all the control levers are at the HOLD or neutral position.

1. Make sure the clips are firmly connected to the battery terminals.
2. Start the engine of the normal machine and keep it to run at high idling speed.
3. Turn the starting switch of the problem machine to the START position and start the engine.
If the engine doesn't start at first, wait for at least 2 minutes before trying again.

DISCONNECTING THE BOOSTER CABLE

After the engine has started, disconnect the booster cables in the reverse of the order in which they were connected.

1. Remove one clip of booster cable (B) from the engine block of the problem machine.
2. Remove the other clip of booster cable (B) from the negative (-) terminal of the normal machine.
3. Remove one clip of booster cable (A) from the positive (+) terminal of the normal machine.
4. Remove the other clip of booster cable (A) from the positive (+) terminal of the problem machine.



OTHER TROUBLE

ELECTRICAL SYSTEM

- (): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Lamp does not glow brightly even when the engine runs at high speed Lamp flickers while engine is running	<ul style="list-style-type: none"> •Defective wiring •Defective adjustment of belt tension 	<ul style="list-style-type: none"> (•Check, repair loose terminals, disconnections) •Adjust alternator belt tension For details, see EVERY 250 HOURS SERVICE
Even when the engine is rotating, the charge caution pilot lamp does not go out	<ul style="list-style-type: none"> •Defective alternator •Defective wiring •Defective adjustment of alternator belt tension 	<ul style="list-style-type: none"> (•Replace) (•Check, repair) •Adjust alternator belt tension For details, see EVERY 250 HOURS SERVICE
Abnormal noise is generated from alternator	<ul style="list-style-type: none"> •Defective alternator 	<ul style="list-style-type: none"> (•Replace)
Starting motor does not turn when starting switch is turned to ON	<ul style="list-style-type: none"> •Defective wiring •Insufficient battery charge 	<ul style="list-style-type: none"> (•Check, repair) •Charge
Pinion of starting motor keeps going in and out	<ul style="list-style-type: none"> •Insufficient battery charge 	<ul style="list-style-type: none"> •Charge
Starting motor turns engine sluggishly	<ul style="list-style-type: none"> •Insufficient battery charge •Defective starting motor 	<ul style="list-style-type: none"> •Charge (•Replace)
Starting motor disengages before engine starts	<ul style="list-style-type: none"> •Defective wiring •Insufficient battery charge 	<ul style="list-style-type: none"> (•Check, repair) •Charge
Preheating pilot lamp does not light up	<ul style="list-style-type: none"> •Defective wiring •Defective glow relay, glow controller, water temperature sensor •Defective preheating pilot lamp 	<ul style="list-style-type: none"> (•Check, repair) (•Replace) (•Replace)
Even when engine is stopped, charge caution pilot lamp does not light up (starting switch at ON position)	<ul style="list-style-type: none"> •Defective wiring •Defective monitor 	<ul style="list-style-type: none"> (•Check, repair) (•Replace)

CHASSIS

- (): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Transmission		
Engine is running but machine does not move	<ul style="list-style-type: none"> •Parking brake is applied •Directional lever is not shifted properly •Lack of oil in transmission case 	<ul style="list-style-type: none"> •Release parking brake •Shift lever properly •Add oil to specified level. See WHEN REQUIRED
Even when engine is run at full throttle, machine only move slowly and lacks power	<ul style="list-style-type: none"> •Lack of oil in transmission case •Screen is clogged 	<ul style="list-style-type: none"> •Add oil to specified level. See WHEN REQUIRED (•Disassemble, clean)
Oil overheats	<ul style="list-style-type: none"> •Too much oil or too little oil •Machine is not traveling in correct speed range •Torque converter is stalled for long periods •Engine is overheating 	<ul style="list-style-type: none"> •Add or drain oil to specified level. See WHEN REQUIRED •Place in correct speed range •Reduce stall time (•Check engine)
Noise generated	<ul style="list-style-type: none"> •Lack of oil 	<ul style="list-style-type: none"> •Add oil to specified level. See WHEN REQUIRED
Axle		
Noise generated	<ul style="list-style-type: none"> •Lack of oil •Improper oil used (for machines with anti-slip differential) 	<ul style="list-style-type: none"> •Add oil to specified level. See WHEN REQUIRED •Change to specified oil
Brake		
Brake is not applied when pedal is depressed	<ul style="list-style-type: none"> •Disc has reached wear limit •Defective hydraulic system² Lack of oil •Air in brake line 	<ul style="list-style-type: none"> (•Replace disc) •Add oil to specified level. See EVERY 100 HOURS •Bleed air See WHEN REQUIRED
Brake drags or remains applied	<ul style="list-style-type: none"> •Vent hole of brake valve is clogged 	<ul style="list-style-type: none"> •Clean
Brakes squeal	<ul style="list-style-type: none"> •Disc is worn •Large amount of water in axle oil •Deteriorated axle oil due to over-use of brake 	<ul style="list-style-type: none"> (•Replace disc) •Change axle oil •Change axle oil

Problem	Main causes	Remedy
Steering		
Steering wheel is heavy	<ul style="list-style-type: none"> •Defective hydraulic system ² Lack of oil 	<ul style="list-style-type: none"> •Add oil to specified level. See EVERY 100 HOURS SERVICE
Steering wheel is loose	<ul style="list-style-type: none"> •Play in steering cylinder pin •Defective hydraulic system ² Lack of oil 	<ul style="list-style-type: none"> •Grease bearing or replace pin and bushing where there is play •Add oil to specified level. See EVERY 100 HOURS SERVICE
Parking brake		
Braking effect is poor	<ul style="list-style-type: none"> •Disc is worn 	<ul style="list-style-type: none"> (•Replace disc)
Brake drags or remains applied	<ul style="list-style-type: none"> •Lack of oil in transmission case •Screen is clogged 	<ul style="list-style-type: none"> •Add oil to specified level. See WHEN REQUIRED (•Disassemble and clean)
Hydraulic system		
Lack of lifting power for bucket Bucket takes time to rise	<ul style="list-style-type: none"> •Lack of oil •Clogged hydraulic tank filter 	<ul style="list-style-type: none"> •Add oil to specified level. See EVERY 100 HOURS SERVICE •Replace filter. See EVERY 2000 HOURS SERVICE
Excessive bubbles in oil	<ul style="list-style-type: none"> •Low quality oil being used •Oil level is low •Air in oil line 	<ul style="list-style-type: none"> •Replace with good quality oil •Add oil to specified level. See EVERY 100 HOURS SERVICE •Bleed air. See EVERY 2000 HOURS SERVICE
Hydraulic pressure is low	<ul style="list-style-type: none"> •Oil level is low and pump is sucking in air 	<ul style="list-style-type: none"> •Add oil to specified level. See EVERY 100 HOURS SERVICE Then bleed air. See EVERY 2000 HOURS SERVICE
Movement of cylinder is irregular	<ul style="list-style-type: none"> •Oil level is low 	<ul style="list-style-type: none"> •Add oil to specified level. See EVERY 100 HOURS SERVICE

ENGINE

- (): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Engine oil pressure caution pilot lamp lights up	<ul style="list-style-type: none"> •Engine oil pan oil level is low (sucking in air) •Clogged oil filter cartridge •Defective tightening of oil pipe joint, oil leakage from damaged part •Defective monitor 	<ul style="list-style-type: none"> •Add oil to specified level, see CHECK BEFORE STARTING •Replace cartridge, see EVERY 500 HOURS SERVICE (•Check, repair) (•Replace)
Steam is emitted from top part of radiator (pressure valve) Water temperature gauge is in red range Coolant temperature monitor lights up	<ul style="list-style-type: none"> •Cooling water level low, water leakage •Defective fan pump or motor •Dirt or scale accumulated in cooling system •Clogged radiator fin or damaged fin •Defective thermostat •Defective thermostat seal •Loose radiator filler cap (high altitude operation) •Defective monitor 	<ul style="list-style-type: none"> •Check, add cooling water, repair, see WHEN REQUIRED (•Check, repair) •Change cooling water, clean inside of cooling system, see WHEN REQUIRED •Clean or repair, see WHEN REQUIRED (•Replace thermostat) (•Replace thermostat seal) •Tighten cap or replace packing (•Replace)
Water temperature gauge is in white range on left	<ul style="list-style-type: none"> •Defective thermostat •Defective monitor 	<ul style="list-style-type: none"> (•Replace thermostat) (•Replace)
Engine does not start when starting motor is turned	<ul style="list-style-type: none"> •Lack of fuel •Air in fuel system •No fuel in fuel filter •Defective supply pump or injector •Starting motor cranks engine too slowly •Starting motor does not turn •Preheating pilot lamp does not light up •Defective valve clearance (Defective compression) 	<ul style="list-style-type: none"> •Add fuel, see CHECK BEFORE STARTING •Repair place where air is sucked in •Fuel filter with fuel. See EVERY 500 HOURS SERVICE (•Replace pump or injector) •See ELECTRICAL SYSTEM •See ELECTRICAL SYSTEM •See ELECTRICAL SYSTEM (•Adjust valve clearance)
Exhaust gas is white or blue	<ul style="list-style-type: none"> •Too much oil in oil pan •Improper fuel 	<ul style="list-style-type: none"> •Add oil to specified level, see CHECK BEFORE STARTING •Change to specified fuel
Exhaust gas occasionally turns black	<ul style="list-style-type: none"> •Clogged air cleaner element •Defective injector •Defective compression •Defective turbocharger 	<ul style="list-style-type: none"> •Clean or replace, see WHEN REQUIRED (•Replace injector) (•See defective compression above) (•Clean or replace turbocharger)
Combustion noise occasionally makes breathing sound	<ul style="list-style-type: none"> •Defective nozzle 	<ul style="list-style-type: none"> (•Replace nozzle)

Abnormal noise generated (combustion or mechanical)	<ul style="list-style-type: none">•Low grade fuel being used•Overheating •Damage inside muffler•Excessive valve clearance	<ul style="list-style-type: none">•Change to specified fuel•Refer to "Water temperature gauge is in red range" as above(•Replace muffler)(•Adjust valve clearance)
---	--	---

MAINTENANCE

 **WARNING**

Please read and make sure that you understand the SAFETY section before reading this section.

GUIDES TO MAINTENANCE

Do not carry out any inspection and maintenance operation that is not found in this manual.

CHECK SERVICE METER:

Check the service meter reading every day to see if the time has come for any necessary maintenance to be carried out.

KOMATSU GENUINE REPLACEMENT PARTS:

Use Komatsu genuine parts specified in the Parts Book as replacement parts.

KOMATSU GENUINE OILS:

Use Komatsu genuine oils and grease. Choose oils and grease with proper viscosities specified for ambient temperature.

ALWAYS USE CLEAN WASHER FLUID:

Use automobile window washer fluid, and be careful not to let any dirt get into it.

ALWAYS USE CLEAN OIL AND GREASE:

Use clean oil and grease. Also, keep the containers of the oil and grease clean. Keep foreign materials away from oil and grease.

CHECKING FOREIGN MATERIALS IN DRAINED OIL AND ON FILTERS:

After oil is changed or filters are replaced, check the old oil and filters for metal particles and foreign materials. If large quantities of metal particles or foreign materials are found, always report to the person in charge, and carry out suitable action.

FUEL STRAINER:

If your machine is equipped with a fuel strainer, do not remove it while fueling.

WELDING INSTRUCTIONS:

- Turn off the engine starting switch.
- Do not apply more than 200V continuously.
- Connect grounding cable within 1m (3.3 ft) from the area to be welded. If grounding cable is connected near instruments, connectors, etc., the instruments may have troubles.
- Avoid seals or bearings from being between the area to be welded and the position of grounding point.
- Do not use the area around the work equipment pins or the hydraulic cylinders as the grounding point.

DO NOT DROP THINGS INSIDE MACHINE:

- When opening inspection windows or the oil filler port of the tank to carry out inspection, be careful not to drop nuts, bolts, or tools inside the machine.
If such things are dropped inside the machine, it will cause damage and malfunction of the machine, and will lead to failure. If you drop anything inside the machine, always remove it immediately.
- Do not put unnecessary things in your pockets. Carry only things which are necessary for inspection.

DUSTY WORKSITES:

When working at dusty worksites, do as follows:

- Inspect the air cleaner clogging monitor frequently to see if the air cleaner is clogged.
Clean the air cleaner element at a shorter interval than specified.
- Clean the radiator core frequently to avoid clogging.
- Clean and replace the fuel filter frequently.
- Clean electrical components, especially the starting motor and alternator, to avoid accumulation of dust.
- When inspecting or changing the oil, move the machine to a place that is free of dust to prevent dirt from getting into the oil.

AVOID MIXING OIL:

Never mix different kinds of oil. If a different type of oil has to be added, drain the old oil and replace all the oil with the new type of oil.

LOCKING INSPECTION COVERS:

Lock inspection cover in position securely with a lock bar. If inspection or maintenance is carried out with the inspection cover open and not locked in position, there is a hazard that it may be suddenly blown shut by the wind and cause injury to the worker.

BLEEDING AIR FROM HYDRAULIC CIRCUIT:

If the hydraulic oil equipments have been repaired or replaced and if the hydraulic hoses, pipes, etc. have been disconnected, it is necessary to bleed air in the circuit. See "CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT (4-52)".

PRECAUTIONS WHEN INSTALLING HYDRAULIC HOSES:

- When removing parts at locations where there are O-rings or gasket seals, clean the mounting surface, and replace with new parts.
When doing this, be careful not to forget to assemble the O-rings and gaskets.
- When installing the hoses, do not twist them or bend them into loops with a small radius.
This will cause damage to the hose and markedly reduce its service life.

CHECKS AFTER INSPECTION AND MAINTENANCE:

If you forget to carry out the checks after inspection and maintenance, unexpected problems may occur, and this may lead to serious injury or property damage. Always do as follows.

- Checks after operation (with engine stopped)
 - Have any inspection and maintenance points been forgotten?
 - Have all inspection and maintenance items been carried out correctly?
 - Have any tools or parts been dropped inside the machine? It is particularly dangerous if parts are dropped inside machine and get caught in the lever linkage mechanism.
 - Is there any leakage of water or oil? Have all the bolts been tightened?
- Check when the engine is running
 - See "TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING (2-27)" in the section on safety for checking when the engine is running. Pay enough attention for safety.
 - Check if the inspected and maintenance area is normally operated.
 - Increase the engine speed to check for the leak of fuel and oil.

OUTLINES OF SERVICE

OUTLINE OF OIL, FUEL, COOLANT

OIL

- Oil is used in the engine and work equipment under extremely severe conditions (high temperature, high pressure), and is deteriorates with use.
Always use oil that matches the grade and temperature for use given in the Operation and Maintenance Manual.
Even if the oil is not dirty, always change the oil after the specified interval.
- Oil corresponds to blood in the human body, so always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from getting in.
The majority of problems with machine are caused by the entry of such impurities.
Take particular care not to let any impurities get in when storing or adding oil.
- Never mix oils of different grades or brands.
- Always add the specified amount of oil.
Having too much oil or too little oil are both causes of problems.
- If the oil in the work equipment is not clear, there is probably water or air getting into the circuit. In such cases, please contact your Komatsu distributor.
- When changing the oil, always replace the related filters at the same time.
- We recommend you have an analysis made of the oil periodically to check the condition of the machine. For those who wish to use this service, please contact your Komatsu distributor.
- At the time of shipping from the factory, SAE10WCD is used for hydraulic type of oil. When HO46-hydraulic oil is going to be used, change specified amount of oil (whole amount). The hydraulic oil that is not recommended by Komatsu can cause clogging of oil filter, so do not use it. The portion of the oil that remains in the piping or cylinders will not be a problem even though it will be mixed into new oil.

FUEL

- The fuel pump is a precision instrument, and if fuel containing water or dirt is used, it cannot work properly.
- Be extremely careful not to let impurities get in when storing or adding fuel.
- Always use the fuel specified in the Operation and Maintenance Manual.
Fuel may congeal depending on the temperature when it is used (particularly in low temperature below -15°C (5°F)). It is necessary to change for the fuel that is suitable for the temperature.
- To prevent the moisture in the air from condensing and forming water inside the fuel tank, always fill the fuel tank after completing the day's work.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If the engine runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.
- The engine mounted on this machine employs electronic control and a high-pressure fuel injection system to obtain good fuel consumption and good exhaust gas characteristics. For this reason, it requires high precision for the parts and good lubrication. If kerosene or other fuel with low lubricating ability is used, there will be a big drop in the durability, so do not use such fuel.

COOLANT

- River water contains large amounts of calcium and other impurities, so if it is used, scale will stick to the engine and radiator, and this will cause defective heat exchange and overheating.
Do not use water that is not suitable for drinking.
- When using anti-freeze, always observe the precautions given in the Operation and Maintenance Manual.
- Komatsu machines are supplied with Komatsu original anti-freeze in the coolant when the machine is shipped. This anti-freeze is effective in preventing corrosion of the cooling system.
The anti-freeze can be used continuously for two years or 4000 hours. Therefore, it can be used as it is even in hot areas.
- Anti-freeze is flammable, so be extremely careful not to expose it to flame or fire.
- The proportion of anti-freeze to water differs according to the ambient temperature.
For details of the mixing proportions, see "CLEAN INSIDE OF COOLING SYSTEM (4-21)".
- If the engine overheats, wait for the engine to cool before adding coolant.
- If the coolant level is low, it will cause overheating and will also cause problems with corrosion from the air in the coolant.

GREASE

- Grease is used to prevent twisting and noise at the joints.
- The nipples not included in the maintenance section are nipples for overhaul, so they do not need grease. If any part becomes stiff after being used for long time, add grease.
- Always wipe off all of the old grease that is pushed out when greasing. Be particularly careful to wipe off the old grease in places where sand or dirt sticking in the grease would cause wear of the rotating parts.

CARRYING OUT KOWA (Komatsu Oil Wear Analysis)

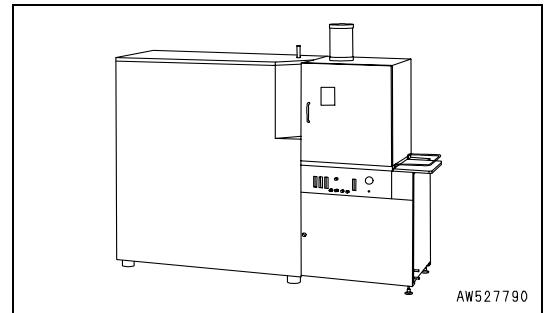
KOWA is a maintenance service that makes it possible to prevent machine failures and down-time. With KOWA, the oil is periodically sampled and analyzed. This enables early detection of wear of the machine drive parts and other abnormalities.

Periodic use of KOWA makes the following possible:

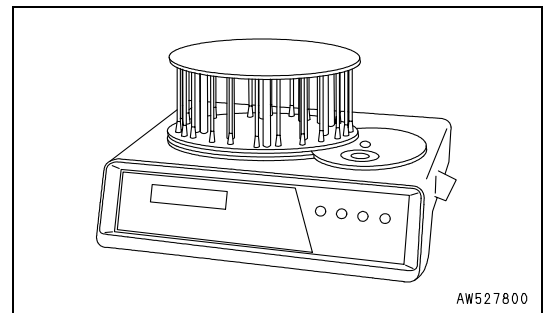
- It enables abnormalities to be detected early, leading to reduction of repair costs and machine downtime.
- It enables repair schedules to be planned, leading to improved machine availability.

KOWA analysis items

- Analysis of metal wear particles
This uses an ICP (Inductively Coupled Plasma) analyzer to measure the density of metal wear particles in the oil.



- Measurement of particle quantity
This uses a PQI (Particle Quantifier Index) measurer to measure the quantity of large iron particles in the oil.



- Others
Measurements are made of items such as the ratio of water or fuel in the oil, and the dynamic viscosity.

Oil sampling

- Sampling interval
250 hours: Engine
500 hours: Other components
- Precautions when sampling
 - Make sure that the oil is well mixed before sampling.
 - Carry out sampling regularly at fixed intervals.
 - Do not carry out sampling on rainy or windy days when water or dust can get into the oil.

For further details of KOWA, please contact your Komatsu distributor.

STORING OIL AND FUEL

- Keep indoors to prevent any water, dirt, or other impurities from getting in.
- When keeping drum cans for a long period, put the drum on its side so that the filler port of the drum can is at the side. (To prevent moisture from being sucked in)
If drum cans have to be stored outside, cover them with a waterproof sheet or take other measures to protect them.
- To prevent any change in quality during long-term storage, be sure to use in the order of first in - first out (use the oldest oil or fuel first).

FILTERS

- Filters are extremely important safety parts. They prevent impurities in the fuel and air circuits from entering important equipment and causing problems.
Replace all filters periodically. For details, see the Operation and Maintenance Manual.
However, when working in severe conditions, replace the filters at shorter intervals according to the oil and fuel (sulfur content) being used.
- Never try to clean the filters (cartridge type) and use them again. Always replace with new filters.
- When replacing oil filters, check if any metal particles are affixed to the old filter. If any metal particles are found, please contact your Komatsu distributor.
- When replacing the engine oil filter, fill the new filter with the specified clean oil, then install it.
- Do not open packs of spare filters until just before they are to be used.
- Always use Komatsu genuine filters.

OUTLINE OF ELECTRIC SYSTEM

- It is extremely dangerous if the electrical equipment becomes wet or the covering of the wiring is damaged. This will cause electrical leakage and may lead to malfunction of the machine. Do not wash the inside of the operator's cab with water. When washing the machine, be careful not to let water get into the electrical components.
- Service relating to the electric system is check of fan belt tension, check of damage or wear in the fan belt and check of battery fluid level.
- Never install any electric components other than there specified by Komatsu.
- External electrical interference may cause malfunction of the control system controller, so before installing a radio receiver or other wireless equipment, please contact your Komatsu distributor.
- When working at the seashore, carefully clean the electric system to prevent corrosion.
- The optional power source must never be connected to the fuse, starting switch, or battery relay.

WEAR PARTS LIST

Wear parts such as the filter element, air cleaner element, bucket tooth, etc. are to be replaced at the time of periodic maintenance or before their abrasion limits.

The wear parts should be changed correctly in order to use the machine economically.

For part change, Komatsu genuine parts of excellent quality should be used.

When ordering parts, please check the part number in the parts book.

THE PARTS IN PARENTHESES ARE TO BE REPLACED AT THE SAME TIME

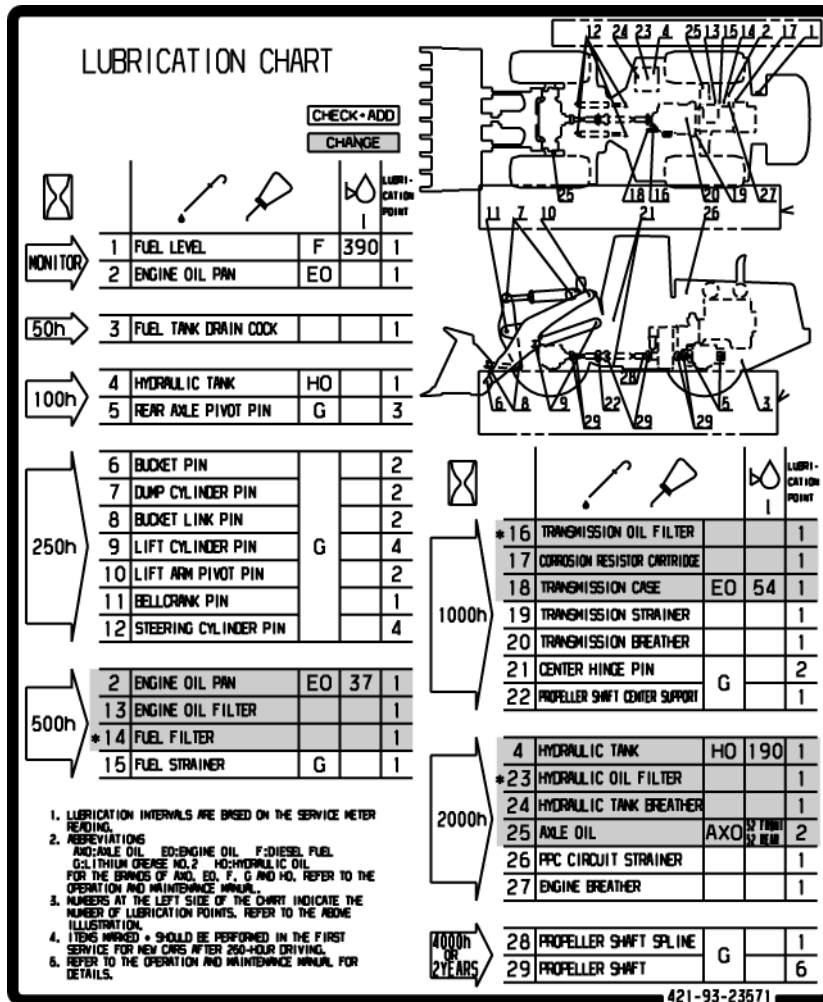
The parts in parentheses are to be replaced at the same time.

*: See Part no. in Parts Book.

Item	Part No.	Part Name	Q'ty	Replacement frequency
Engine oil filter	*	Cartridge	1	EVERY 500 HOURS
Fuel filter	*	Cartridge	1	EVERY 500 HOURS
Fuel strainer	*	O-ring	1	-
Transmission oil filter	*	Cartridge	1	EVERY 1000 HOURS
Transmission strainer	*	O-ring	1	EVERY 1000 HOURS
Corrosion resistor	*	Cartridge	1	EVERY 1000 HOURS
Hydraulic filter	*	Element (O-ring)	1 (1)	EVERY 2000 HOURS
Hydraulic tank breather	*	Element	1	EVERY 2000 HOURS
Air cleaner	*	Element ass'ly	1	-
Air conditioner air filter	*	Element	1	EVERY 2000 HOURS
Bolt on cutting edge	*	Center edge	1	-
		Side edge	2	
		(Bolt)	(16)	
Long life type	*	Center edge	2	-
		Side edge	2	
		(Bolt)	(16)	
Segment type	*	Center edge	6	-
		Side edge	2	
		(Bolt)	(16)	
		(Nut)	(16)	
		(Washer)	(16)	

LUBRICANTS AND OPERATING MEANS

LUBRICATION CHART



- Lubrication intervals are based on the service meter reading.
- Abbreviations:
 EO = Engine Oil, G = Lithium Grease No. 2,
 F = Diesel Fuel, AXO = Axle Oil (AXO 75),
 HO = Hydraulic Oil.
- Numbers at the left side of the chart indicate the number of lubrication points. Refer to the above illustration.
- Items marked * should be performed in the first service for new machines after 250 hour driving.

LUBRICANTS, FUELS AND FILLING CAPACITIES

WA470-5H	LUBRICANTS, FUELS AND FILLING CAPACITIES					
	Lubricants and operating mediums	BI code*****	Quality grades	Temperature rangese	Viscosity ranges	Filling capacities in litres
Engine	Engine oil	EO 1540 A EO 1030 A EO 30 EO 10	CCMC D4 or, if not available: API CE oder API CF -4	-15° up to 50° C -20° up to 40° C 0° up to 40° C -20° up to 10° C	SAE 15W-40*) SAE 10W-30 SAE 30 SAE 10W	47 (38 **)
Transmission	Engine oil	EO 10	CCMC D4 or, if not available: API CD	-30° up to 40° C	SAE 10W*)	65 (54 **)
Hydraulic system	Hydraulic oil	HYD 0530	HVLP, HVLP D	-30° up to 40° C	ISO VG46*) (SAE 5W-30)	280 (186**)
	or Engine oil	EO 10	CCMC D4 or, if not available: API CD	-30° up to 40° C	SAE 10W	
Axles with standard lock differential	Axle oil	AXO AXO 75	Fuchs: RENOGEAR HYDRA ZF20W-40	-10° up to 45° C -30° up to 40° C	SAE 20W-40 *) 75W	ever 52 (ever 52**)
	or Engine oil	EO 30	CCMC D4 or, if not available: API CD	0° up to 30° C	SAE 30	
Axles with limited slip differential	Axle oil	AXO	Shell: DONAX TD5W-30*** Esso: TORQUE FLUID 56**** Mobil: MOBILFLUID 424 Fuchs: RENOGEAR HYDRA ZF20W-40		SAE 5W-30 SAE 20W-40 *)	
Fuel tank	Diesel fuel	ASTM D975 No.1 ASTM D975 No.2 DIN-EN 590	CFPP class B CFPP class D CFPP class F	-30° up to -10° C -10° up to 40° C 0° up to 40° C -10° up to 40° C -20° up to 40° C	-----	390
Grease nippels	Multi purpose grease on a lithium base	MPG-A	KP2N-20	-----	NLGI-No. 2	---
Grease nippels for central lubrication (up to -20° C)	Multi purpose grease on a lithium base	MPG-A	KP2N-20	up to -20° C	NLGI-No. 2	---
Grease nippels for central lubrication (below -20° C)	Grease for central lubrications	MPG-G	-----	-40° up to 100°C	NLGI-No. 00/000	---
Cooling system	Water	SP-C	Add antifreeze with corrosion resistor			50

* Works filling

** Top-up quantity

*** North American manufactured DONAX TD 20W-40 must not be used.

**** North American manufactured TORQUE FLUID 56 must not be used.

***** Short codes for regular lubricants.

REMARK

- When fuel sulphur content is less than 0.5%, change oil in the oil pan according to every periodic maintenance hours described in this manual.
- Change oil according to the following table if fuel sulphur content is above 0.5%.
- When starting the engine with an atmospheric temperature of lower than 0°C (32°F), be sure to use engine oil of SAE10W, SAE10W-30 and SAE15W-40, even though the atmospheric temperature goes up to 10°C (50°F) more or less during the day.
- Use API classification CD as engine oil and if API classification CC, reduce the engine oil change interval to half.
- There is no problem if single grade oil is mixed with multigrade oil (SAE10W-30, 15W-40), but be sure to add single grade oil that matches the temperature range in the table.
- We recommend Komatsu genuine oil which has been specifically formulated and approved for use in engine and hydraulic work equipment applications.

Specified capacity: Total amount of oil including oil for components and oil in piping.

Refill capacity: Amount of oil needed to refill system during normal inspection and maintenance.

ASTM: American Society of Testing and Material

SAE: Society of Automotive Engineers

API: American Petroleum Insitute

Fuel sulphur content	Charge interval of oil in engine oil pan
0.5 to 1.0%	1/2 of regular interval
Above 1.0%	1/4 of regular interval

No	Supplier	Engine Oil [CD or CE] SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	Gear Oil [GL-4 or GL-5] SAE80, 90, 140	Grease [Lithium-Base] NLGI No.2	Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type
1	KOMATSU	EO10-CD EO30-CD EO10-30CD EO15-40CD	GO90 GO140	G2-LI G2-LI-S	AF-ACL AF-PTL AF-PT(Winter, one season type)
2	AGIP	Diesel sigma S super dieselmulti- grade *Sigma turbo	Rotra MP	GR MU/EP	-
3	AMOCO	*Amoco 300	Multi-purpose gear oil	PYKON premium grease	-
4	ARCO	*Arcofleet S3 plus	Arco HD gear oil	Litholine HEP 2 Arco EP moly D	-
5	BP	Vanellus C3	Gear oil EP Hypogear EP	Energrease LS-EP2	Antifreeze
6	CALTEX	*RPM delo 400 RPM delo 450	Universal thuban Universal thuban EP	Marfak all purpose 2 Ultra-duty grease 2	AF engine cool- ant
7	CASTROL	*Turbomax *RX super CRD	EP EPX Hypoy Hypoy B Hypoy C	MS3 Spheerol EPL2	Anti-freeze
8	CHEVRON	*Delo 400	Universal gear	Ultra-duty grease 2	-
9	CONOCO	*Fleet motor oil	Universal gear lubricant	Super-sta grease	-
10	ELF	Multiperformance 3C Performance 3C	-	Tranself EP Tranself EP type 2	Glacelf
11	EXXON (ESSO)	Essolube D3 *Essolube XD-3 *Essolube XD-3 Extra *Esso heavy duty Exxon heavy duty	Gear oil GP Gear oil GX	Beacon EP2	All season cool- ant
12	GULF	Super duty motor oil *Super duty plus	Multi-purpose gear lubricant	Gulfcrown EP2 Gulfcrown EP special	Antifreeze and coolant
13	MOBIL	Delvac 1300 *Delvac super 10W-30, 15W-40	Mobilube GX Mobilube HD	Mobilux EP2 Mobilgease 77 Mobilgrease special	-

No	Supplier	Engine Oil [CD or CE] SAE10W, 30, 40 10W30, 15W40 (The 15W40 oil marked * is CE.)	Gear Oil [GL-4 or GL-5] SAE80, 90, 140	Grease [Lithium-Base] NLGI No.2	Anti-freeze Coolant [Ethylene Glycol Base] Permanent Type
14	PEN- NZOIL	*Supreme duty fleet motor oil	Multi-purpose 4092 Multi-purpose 4140	Multi-purpose white grease 705 707L White-bearing grease	Anti-freeze and summer coolant
15	PETRO- FINE	FINA kappa TD	FINA potonic N FINA potonic NE	FINA marson EPL2	FINA tamidor
16	SHELL	Rimura X	Spirax EP Spirax heavy duty	Albania EP grease	-
17	SUN	-	Sunoco GL5 gear oil	Sunoco ultra prestige 2EP Sun prestige 742	Sunoco anti- freeze and summer coolant
18	TEXACO	*Ursa super plus Ursa premium	Multigear	Multifak EP2 Starplex 2	Coda 2055 star- tex antifreeze cool- ant
19	TOTAL	Rubia S *Rubia X	Total EP Total Transmission TM	Multis EP2	Antigal/antifreeze
20	UNION	*Guardol	MP gear lube LS	Unoba EP	-
21	VEEDOL	*Turbostar *Diesel star MDC	Multigear Multigear B Multigear C	-	Antifreeze

STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS

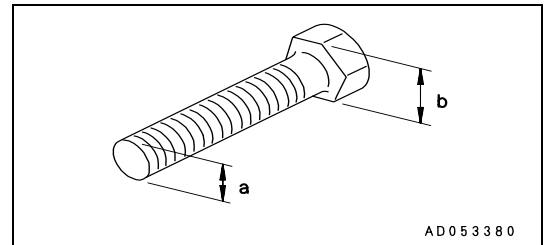
TORQUE LIST



If nuts, bolts, or other parts are not tightened to the specified torque, it will cause looseness or damage to the tightened parts, and this will cause failure of the machine or problems with operation. Always pay careful attention when tightening parts.

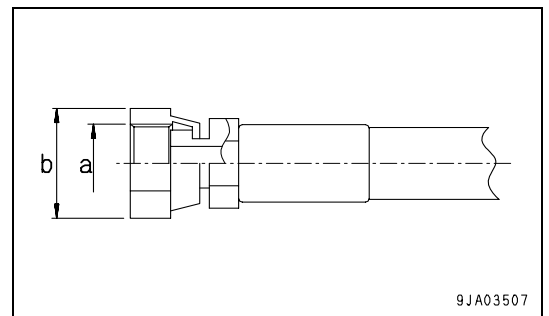
Unless otherwise specified, tighten the metric nuts and bolts to the torque shown in the table below. The tightening torque is determined by the width across the flats of the nut and bolt. If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.

Thread diameter of bolt (a)(mm)	Width across flats (b)(mm)	Tightening torque					
		Target value			Service limit		
		N ² m	kgf ² m	lbft	N ² m	kgf ² m	lbft
6	10	13.2	1.35	9.8	11.8-14.7	1.2-1.5	8.7-10.8
8	13	31	3.2	23.1	27-34	2.8-3.5	20.3-25.3
10	17	66	6.7	48.5	59-74	6.0-7.5	43.4-54.2
12	19	113	11.5	83.2	98-123	10.0-12.5	72.3-90.4
14	22	177	18	130.2	157-196	16.0-20.0	115.7-144.7
16	24	279	28.5	206.1	245-309	25.0-31.5	180.8-227.8
18	27	382	39	282.1	343-425	35.0-43.5	253.2-314.6
20	30	549	56	405.0	490-608	50.0-62.0	361.7-448.4
22	32	745	76	549.7	662-829	67.5-84.5	488.2-611.2
24	36	927	94.5	683.5	824-1030	84.0-105.0	607.6-759.5
27	41	1320	135.0	976.5	1180-1470	120.0-150.0	868.0-1085.0
30	46	1720	175.0	1265.8	1520-1910	155.0-195.0	1121.1-1410.4
33	50	2210	225.0	1627.4	1960-2450	200.0-25.0	1446.6-1808.3
36	55	2750	280.0	2025.2	2450-3040	250.0-310.0	1808.3-2242.2
39	60	3280	335.0	2423.1	2890-3630	295.0-370.0	2133.7-2676.2



Apply the following table for Hydraulic Hose.

Nominal - No. of threads (a)	Width across flats (b)(mm)	Tightening torque (N ² m {kgf ² m})	
		Target value	Permissible range
9/16 -18UNF	19	44 {4.5}	35 - 63{3.5 - 6.5}
11/16 -16UN	22	74 {7.5}	54 - 93 {5.5 - 9.5}
13/16 -16UN	27	103 {10.5}	84 - 132 {8.5 - 13.5}
1 -14UNS	32	157 {16.0}	128 - 186 {13.0 - 19.0}
1•3/16 -12UN	36	216 {22.0}	177- 245 {18.0 - 25.0}



PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS

To ensure safety at all times when operating or driving the machine, the user of the machine must always carry out periodic maintenance. In addition, to further improve safety, the parts in the safety-critical parts list must also be replaced at the specified interval. These parts are particularly closely connected to safety and fire prevention, so please contact your Komatsu distributor to have them replaced.

With these parts, the material changes as time passes, or they easily wear out or deteriorate. However, it is difficult to judge the condition of the parts simply by periodic maintenance, so they should always be replaced after a fixed time has passed, regardless of their condition. This is necessary to ensure that they always maintain their function completely.

However, if these parts show any abnormality before the replacement interval has passed, they should be repaired or replaced immediately.

If the hose clamps show any deterioration, such as deformation or cracking, replace the clamps at the same time as the hoses.

In addition, carry out the checks for the hydraulic hoses other than periodic replacement parts. If any abnormality is found, tighten the clamps or replace the parts.

When replacing the hoses, always replace the O-rings, gaskets, and other such parts at the same time.

No.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
1	Fuel hose (fuel tank - fuel strainer)	1	Every 2 years or every 4000 hours, whichever comes first
2	Fuel hose (fuel strainer - supply pump)	1	
3	Fuel return hose (supply pump - fuel tank)	1	
4	Fuel hose (supply pump - fuel filter)	1	
5	Fuel hose (fuel filter - supply pump)	1	
6	Fuel spill hose (unit injector - fuel tank)	1	
7	Steering hose (pump - steering valve)	1	
8	Steering hose (steering valve - steering cylinder)	4	
9	Steering hose (steering valve - hydraulic tank)	2	
10	Brake hose (pump - accumulator charge valve)	2	
11	Brake hose (accumulator charge valve - check valve))	1	
12	Brake hose (check valve - tandem valve)	2	
13	Brake hose (check valve - single valve)	1	
14	Brake hose (check valve - accumulator P.P port)	1	
15	Brake hose (tandem valve - front brake)	2	
16	Brake hose (tandem valve - rear brake)	2	
17	Brake hose (single valve - tandem valve)	1	
18	Brake hose (tandem valve - drain block)	1	
19	Brake hose (single valve - drain block)	1	
20	Brake hose (drain block - hydraulic tank)	1	
21	Brake hose (brake accumulator - reduction valve for emergency parking brake cancel)	1	
22	Brake hose (transmission valve - reduction valve for emergency parking brake cancel)	1	
23	Brake hose (charge valve drain - hydraulic tank)	1	

MAINTENANCE SCHEDULE CHART

MAINTENANCE SCHEDULE CHART

INITIAL 250 HOURS SERVICE(ONLY AFTER THE FIRST 250 HOURS)

CHANGE TRANSMISSION OIL FILTER CARTRIDGE, CLEAN STRAINER.....	4-50
REPLACE HYDRAULIC FILTER ELEMENT	4-52

WHEN REQUIRED

CHECK, CLEAN, OR REPLACE AIR CLEANER ELEMENT	4-18
CLEAN INSIDE OF COOLING SYSTEM.....	4-21
CHECK TRANSMISSION OIL LEVEL, ADD OIL.....	4-24
CHECK AXLE OIL LEVEL, ADD OIL.....	4-25
CHECK AXLE CASE BREATHER.....	4-26
CLEAN CONDENSER OF AIR CONDENSER	4-26
CHECK WINDOW WASHING FLUID LEVEL, ADD FLUID.....	4-27
CLEAN RADIATOR FINS AND COOLER FINS	4-28
CHECK ELECTRICAL INTAKE AIR HEATER.....	4-31
REPLACE BOLT ON CUTTING EDGE	4-31
REPLACE BUCKET TEETH.....	4-32
CHECK AIR CONDITIONER	4-33
REPLACE SLOW BLOW FUSE.....	4-34
SELECTION AND INSPECTION OF TIRES.....	4-35

CHECK BEFORE STARTING

CHECK BEFORE STARTING.....	4-37
----------------------------	------

EVERY 50 HOURS SERVICE

DRAIN WATER, SEDIMENT FROM FUEL TANK.....	4-38
---	------

EVERY 100 HOURS SERVICE

CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL	4-39
CLEAN ELEMENT IN AIR CONDITIONER FRESH AIR FILTER.....	4-40

EVERY 250 HOURS SERVICE

CHECK ENGINE ELECTROLYTE LEVEL.....	4-41
CHECK PARKING BRAKE	4-42
CHECK ALTERNATOR BELT TENSION, ADJUST	4-43
CHECK AIR CONDITIONER COMPRESSOR BELT TENSION, ADJUST	4-44
CHECK FOR LOOSE WHEEL HUB NUTS, TIGHTEN.....	4-44
CLEAN ELEMENT IN AIR CONDITIONER RECIRCULATION FILTER.....	4-45

EVERY 500 HOURS SERVICE

CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE	4-46
REPLACE FUEL FILTER CARTRIDGE.....	4-47
CLEAN FUEL STRAINER.....	4-49

EVERY 1000 HOURS SERVICE

CHANGE OIL IN TRANSMISSION CASE AND TRANSMISSION OIL FILTER CARTRIDGE, CLEAN STRAINER 4-50
 CLEAN TRANSMISSION CASE BREATHER 4-51
 CHECK TIGHTENING PARTS OF TURBOCHARGER 4-51
 CHECK PLAY OF TURBOCHARGER ROTOR..... 4-51
 REPLACE CORROSION RESISTOR CARTRIDGE..... 4-51

EVERY 2000 HOURS SERVICE

CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT 4-52
 REPLACE HYDRAULIC TANK BREATHER ELEMENT 4-54
 CHANGE AXLE OIL(*) 4-55
 REPLACE ELEMENT IN AIR CONDITIONER RECIRCULATION AIR FILTER, FRESH AIR FILTER 4-55
 CLEAN PPC CIRCUIT STRAINER..... 4-56
 CLEAN ENGINE BREATHER ELEMENT 4-56
 CHECK ALTERNATOR, STARTING MOTOR 4-56
 CHECK ENGINE VALVE CLEARANCE, ADJUST 4-56
 CLEAN AND CHECK TURBOCHARGER 4-56
 CHECK INJECTOR..... 4-57
 CHECK ACCUMULATOR GAS PRESSURE 4-57
 CHECK VIBRATION DAMPER..... 4-57
 CHECK BRAKE DISC WEAR 4-58

*: The interval of 2000 hours for changing the axle oil is for standard operations. If the brake is used frequently or the brakes make a sound, change the oil after a shorter interval.

EVERY 4000 HOURS SERVICE

LUBRICATING 4-59
 CHECK WATER PUMP 4-59
 CHECK AIR CONDITIONER COMPRESSOR, ADJUST 4-60
 CHECK INJECTOR NOZZLE TIP 4-60
 CHECKING FOR LOOSENESS OF HIGH-PRESSURE CLAMP, HARDENING OF RUBBER..... 4-60
 CHECKING FOR MISSING FUEL SPRAY PREVENTION CAP, HARDENING OF RUBBER..... 4-61

EVERY 8000 HOURS SERVICE

REPLACE HIGH-PRESSURE PIPING CLAMP 4-62
 REPLACE FUEL SPRAY PREVENTION CAP 4-62
 CHECK INJECTOR NOZZLE TIP, REPLACE IF NECESSARY 4-62

SERVICE PROCEDURE

INITIAL 250 HOURS SERVICE

Carry out the following maintenance only after the first 250 hours.

- CHANGE TRANSMISSION OIL FILTER CARTRIDGE
- REPLACE HYDRAULIC FILTER ELEMENT

For details of the method of replacing or maintaining, see the section on EVERY 1000 HOURS and 2000 HOURS SERVICE.

WHEN REQUIRED

CHECK, CLEAN, OR REPLACE AIR CLEANER ELEMENT

WARNING

- If inspection, cleaning, or maintenance is carried out with the engine running, dirt will get into the engine and the engine will suffer damage. Always stop the engine before carrying out these operations.
- When using compressed air, there is danger that dirt may be blown around and cause serious injury.
- Always use safety glasses, dust mask, and other protective equipment.

CHECKING

If air cleaner clogging caution lamp (1) on the machine monitor lights up, clean the air cleaner element.

NOTICE

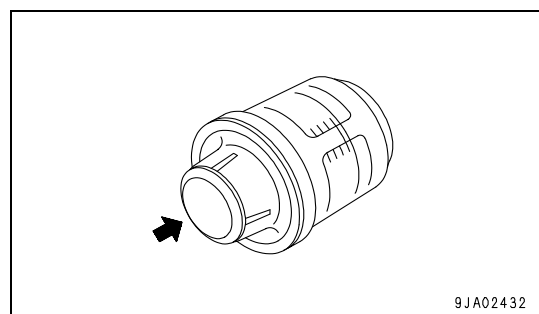
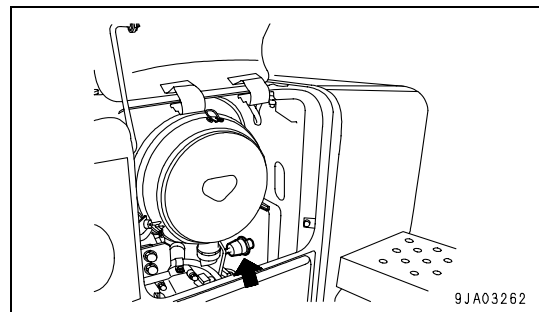
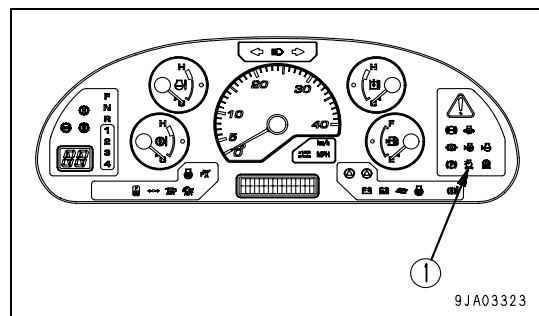
Do not clean the element until the air cleaner clogging caution lamp lights up.

If the element is cleaned frequently before the air cleaner clogging caution lamp lights up, the air cleaner will not be able to display its performance fully and the cleaning efficiency will drop.

In addition, the frequency of dirt stuck to the element falling inside the inner element will increase.

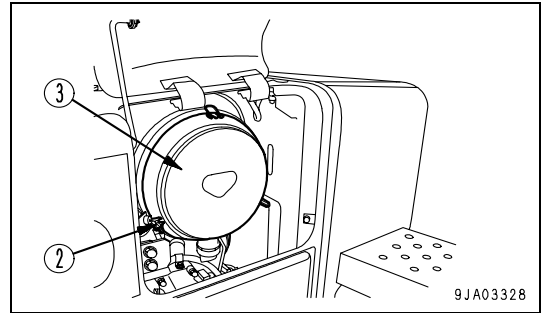
It is also possible to check the condition of the air cleaner by using the dust indicator installed to the air cleaner.

After cleaning or replacing the air cleaner, press the reset button at the top of the dust indicator to return the display to its original position.



CLEANING OR REPLACING OUTER ELEMENT

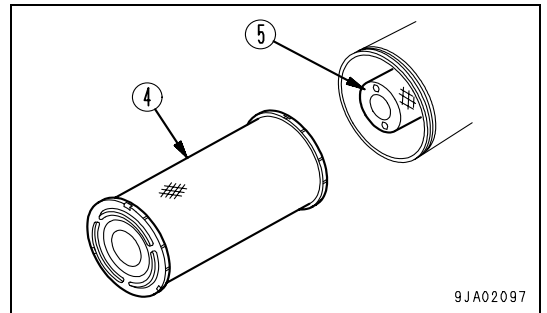
1. 1. Open the top cover at the front of the engine side cover on the right side of the machine.
2. Remove three clips (2), then remove dust cup (3).



3. Remove outer element(4).

NOTICE

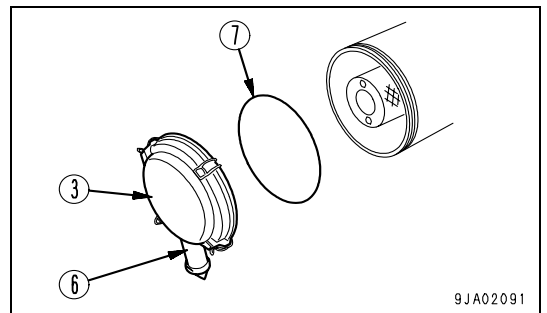
Never remove inner element (5). If it is removed, dust will enter and cause an engine trouble.



NOTICE

When cleaning the dust cup, do not remove evacuator valve(6).

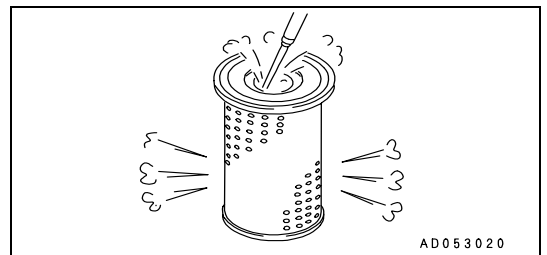
4. Clean the inside of the air cleaner body and dust cup.



NOTICE

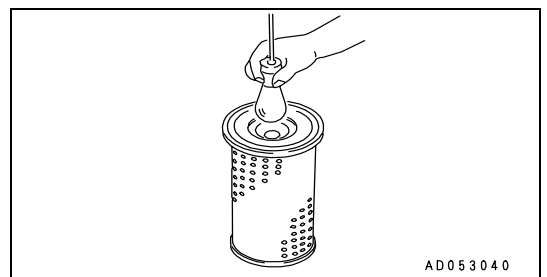
The inner element must not be cleaned and used again. When replacing the outer element, replace the inner element at the same time.

5. Direct dry compressed air (less than 0.69 MPa (7 kg/cm², 99.4 PSI)) to the outer element (3) from inside along its folds, then direct it from outside along its folds and again from inside
6. If small holes or thinner parts are found on the element when it is checked by shining a light through it after cleaning, replace the element.



NOTICE

When cleaning the element, do not hit or beat it against anything. Do not use an element whose folds, gasket or seal are damaged.



7. Set the cleaned outer element and install dust cup(3), then secure them with clips(2).

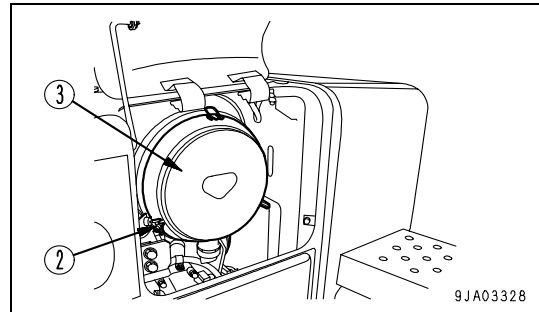
⚠ CAUTION

When installing the dust cup, check O-ring(7). If the O-ring has any defect, replace it.

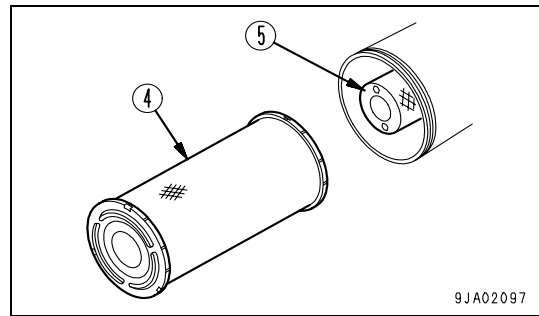
8. Press the dust indicator button to return the yellow piston to its original position.
9. Close the top cover at the front of the engine side cover on the right side of the machine.
After cleaning, if the air cleaner clogging caution lamp lights up immediately or the yellow piston reaches the red line (7.5 kPa), replace the inner and outer elements.

REPLACING ELEMENT

1. 1. Open the top cover at the front of the engine side cover on the right side of the machine.
2. Remove three clips (2), then remove dust cup (3).



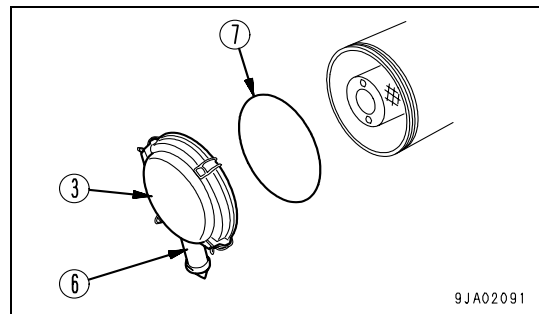
3. Remove outer element(4).
Do not remove inner element(5) at this time, however.



NOTICE

When cleaning the dust cup, do not remove evacuator valve(6).

4. Clean the inside of the air cleaner body and dust cup.



5. Remove inner element(5), then install a new inner element immediately.
6. Set new outer element(4) and install dust cup(3), then secure them with clips(2).

⚠ CAUTION

When installing the dust cup, check O-ring(7). If the O-ring has any defect, replace it.

7. Press the dust indicator button to return the yellow piston to its original position.
8. Close the top cover at the front of the engine side cover on the right side of the machine.

CLEAN INSIDE OF COOLING SYSTEM

 WARNING

- Immediately after the engine is stopped, the engine coolant is hot and the pressure inside the radiator is high. Removing the cap and draining the water under this condition could cause burns. Allow the engine to cool down, then turn the cap slowly to release the pressure.
- Start the engine and flush the system. When standing up or leaving the operator’s seat, set the shift lever to the N position and set the parking brake switch to the PARKING position.
- For details of starting the engine, see “CHECK BEFORE STARTING ENGINE, ADJUST (3-66)” and “STARTING ENGINE (3-81)” in the OPERATION section of the Operation and Maintenance Manual.
- When the undercover is removed, there is danger of touching the fan.
- Never go to the rear of the machine when the engine is running.

Stop the machine on level ground when cleaning or changing the coolant.

Clean the inside of the cooling system, change the coolant and replace the corrosion resistor according to the table below.

Kind of coolant	Cleaning inside of cooling system and changing coolant	Replacing corrosion resistor
Permanent type antifreeze (All season type)	Every year (autumn) or every 2000 hours, whichever comes first	Every 1000 hours and when cleaning the inside of the cooling system and when changing coolant.
Nom-permanent type antifreeze containing ethylene glycol (winter, one season type)	Every 6 months (spring, autumn) (Drain antifreeze in spring, add antifreeze in autumn)	
When not using antifreeze	Every 6 months or every 1000 hours, whichever comes first	

Super Coolant (AF-ACL) has an anti-corrosion effect as well as an antifreeze effect.

The ratio of antifreeze to water depends on the ambient temperature, but to obtain the corrosion resistance effect, a minimum ratio of 30% by volume is necessary.

When deciding the ratio of antifreeze to water, check the lowest temperature in the past, and decide from the mixing rate table given below.

It is actually better to estimate a temperature about 10°C (50°F) lower when deciding the mixing rate.

Mixing rate of water and antifreeze

Min. atmospheric temperature	°C	-10	-15	-20	-25	-30
	°F	14	5	-4	-13	-22
Amount of antifreeze	Liters	15.0	17.5	20	22.5	25.0
	US gal	3.96	4.62	5.28	5.94	6.61
Amount of water	Liters	35.0	32.5	30.0	27.5	25.0
	US gal	9.25	8.59	7.93	7.27	6.60

 WARNING

Antifreeze is flammable, so keep it away from flame.

Antifreeze is toxic. When removing the drain plug, be careful not to get water containing antifreeze on you. If it gets in your eyes, flush your eyes with large quantities of fresh water and see a doctor at once.

Use city water for the cooling water.

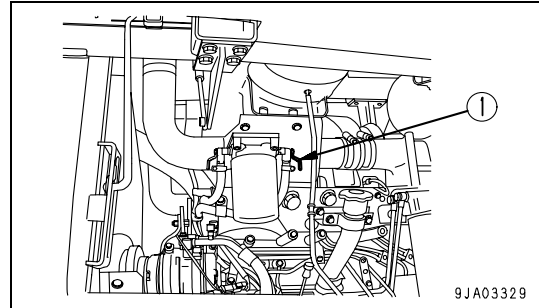
If river water, well water or other such water supply must be used, contact your Komatsu distributor.

We recommend use of an antifreeze density gauge to control the mixing proportions.

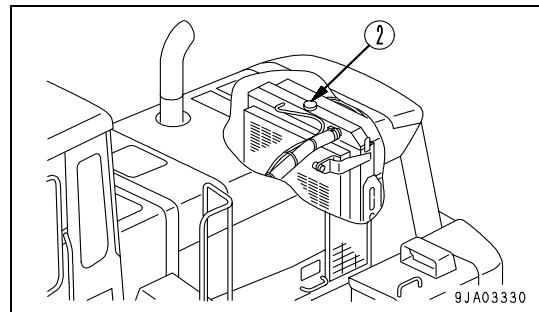
Prepare the following:

Container to mix the coolant: Min 50 liters (13.21 US gal) capacity

1. Stop the engine and tighten 2 valves (1) of the corrosion resistor.



2. Turn radiator cap (2) slowly to release the pressure, then remove it.



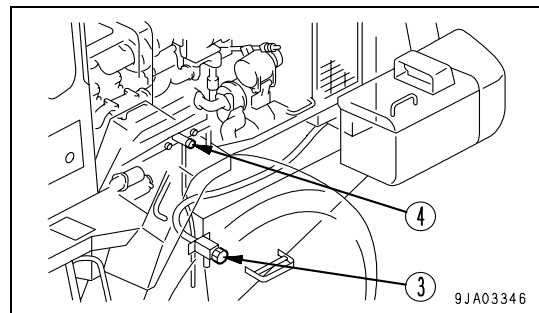
3. Set a container in position to catch the drained antifreeze mixture, then open drain valve (3) under the left side of the fuel tank and drain plug (4) at the side face of the cylinder block, and drain the coolant.

4. After draining the coolant, close drain valve (3) and drain plug (4) and fill with city water.

5. When the radiator is full, start the engine, and run it at low idling.

Keep the engine running at low idling for 10 minutes until the water temperature reaches more than 90°C (194°F).

6. Stop the engine, open drain valve (3) and drain plug (4), drain the water, then tighten them again.



7. After draining the water, clean the cooling system with cleaning agent.

For the cleaning method, see the instructions for the cleaning agent.

8. Replace the corrosion resistor, then open 2 valves (1).

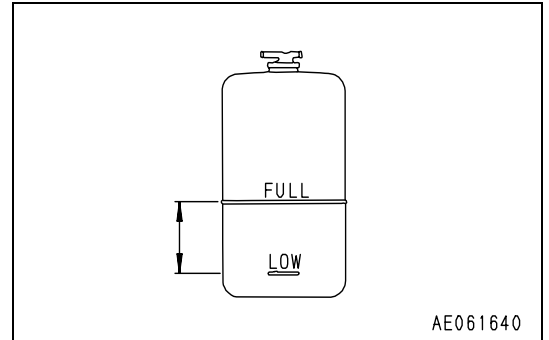
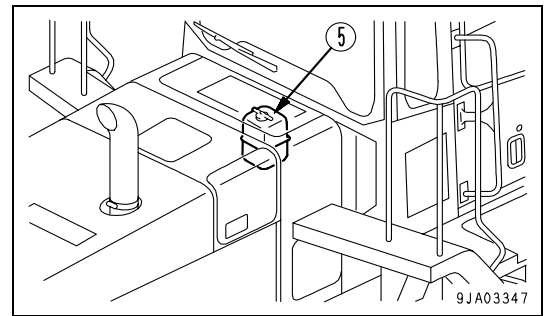
For details of the procedure for replacing the corrosion resistor, see "REPLACE CORROSION RESISTOR CARTRIDGE (4-51)".

9. Add cooling water until it overflows from the water filler.

Decide the proportions of antifreeze and water according to the table for the mixing rate of water and anti-freeze.

10. To remove the air in the cooling system, run the engine for 5 minutes at low idling, and for another 5 minutes at high idling. (When doing this, leave the radiator cap off.)

11. Drain the coolant from sub-tank (5), clean the inside of the sub-tank, then add water until the coolant level is between the FULL and LOW marks.
12. Stop the engine, wait for approx. 3 minutes, then add tap water until the water level is near the water filler port, and tighten the cap. Check the coolant level and add water if necessary.



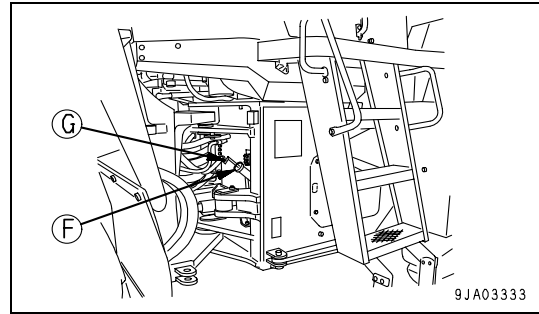
CHECK TRANSMISSION OIL LEVEL, ADD OIL

⚠ WARNING

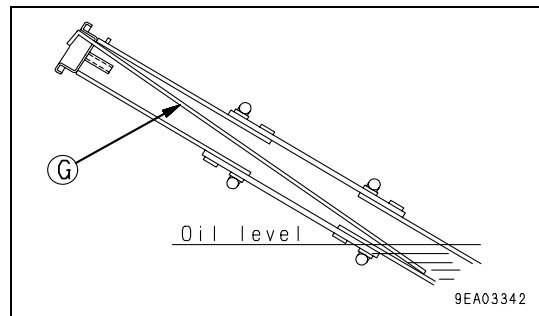
The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.

Carry out this procedure if there is any sign of oil on the transmission case, or if there is oil mixed with the cooling water.

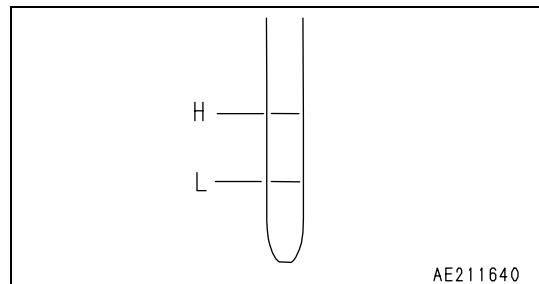
1. Start the engine and run it for at least 5 minutes.
2. Open the cap of oil filler port (F), remove dipstick (G), and wipe the oil off with a cloth.



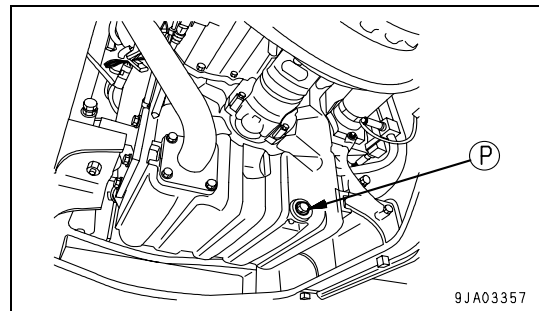
3. Insert dipstick (G) again from the top of the oil filler port diagonally as shown in the diagram, then pull it out again. When doing this, insert the dipstick so that the tip contacts the bottom of the dipstick guide.



4. The oil level should be between the H and L marks on dipstick (G). If the oil level is below the L mark, add engine oil through oil filler (F).



5. If the oil is above the H mark, drain the excess engine oil from drain plug(P), and check the oil level again.
6. If the oil level is correct, insert dipstick (G) in the dipstick guide, then tighten the cap



CHECK AXLE OIL LEVEL, ADD OIL

⚠ WARNING

- When checking the oil level, apply the parking brake and secure the front and rear frames with the safety bar.
- After stopping the engine, the parts and oil are at a high temperature. Wait for the temperature to go down before starting the operation.

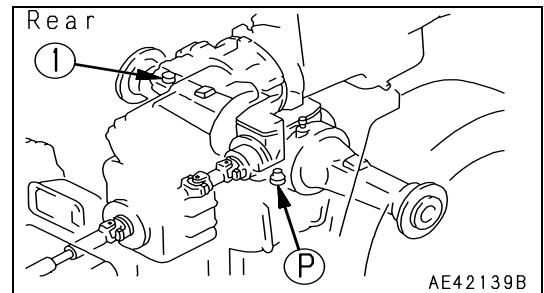
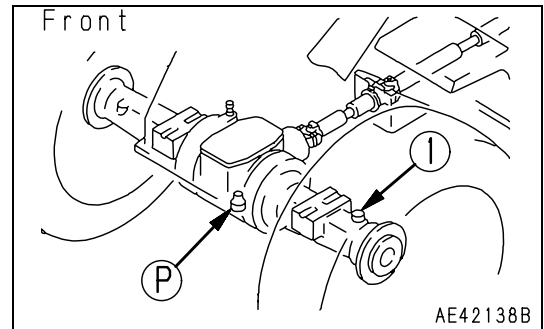
Carry out this procedure if there is any sign of oil on the axle case.
 Carry out the inspection with the machine on a horizontal road surface.
 (If the road surface is at an angle, the oil level cannot be checked correctly.)

1. Stop the engine and remove oil level plug (1).

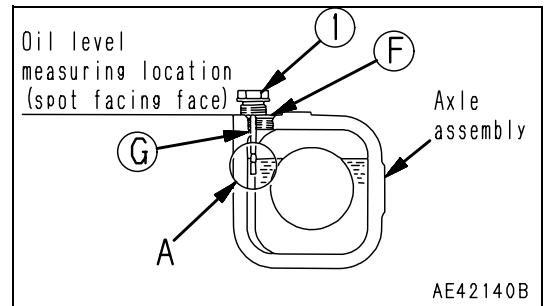
REMARK

Remove the mud and dirt from around plug (1), then remove the plug.

2. Wipe off any oil adhering to the oil level gauge attached to plug (1) with waste cloth.



3. Set the oil level gauge (G) as shown in the right diagram.
4. The oil level is correct when it is between the two lines provided on the oil level gauge.
 If the oil level does not reach the lower line, add axle oil through filler port (F).

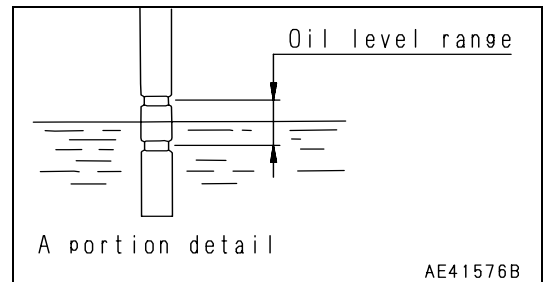


REMARK

For axles with ASD (Anti-Slip Differential), the brand of lubricating oil is different, so always use the specified lubricating oil.

5. If the oil level is above the upper line, drain off the excess oil through drain plug (P) and check the oil level again.
6. If the oil level is correct, install plug (1).

Tightening torque: $132 \pm 39 \text{ N}^2\text{m}$
 ($13.5 \pm 4 \text{ kgf}^2\text{m}$, $97.6 \pm 28.9 \text{ lbf}^2\text{ft}$)



CHECK AXLE CASE BREATHER

⚠ WARNING

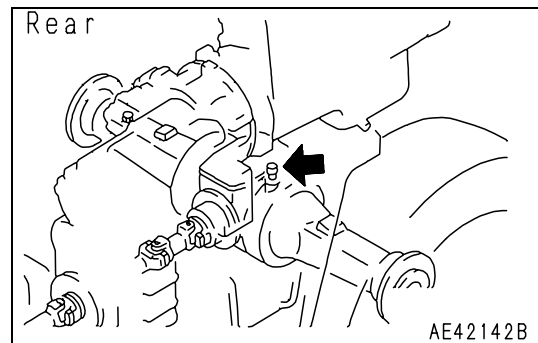
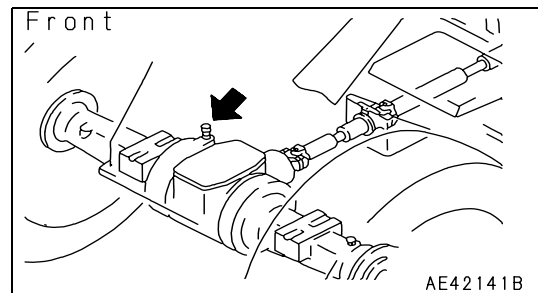
When cleaning the axle breather, apply the parking brake and secure the front and rear frames with the safety bar.

Remove all mud and dirt from around the breather with a brush.

After removing the mud or dirt from around the breather, remove the breather, immerse it in cleaning fluid and clean it.

When cleaning the breather, clean the breathers at two places (front and rear).

After removing the breather, take steps to prevent dirt or dust from entering the mount.



CLEAN CONDENSER OF AIR CONDENSER

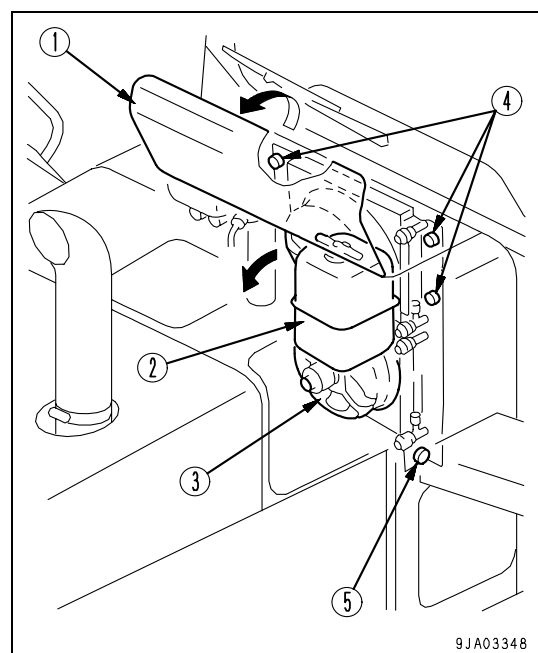
⚠ WARNING

- Do not wash the condenser with a steam cleaner. There is danger that the condenser overheat.
- If high-pressure water hits your body directly or dirt is sent flying the high-pressure water, there is danger of personal injury. Always wear protective glasses, dust mask, and other protective equipment.

If there is mud or dust on the air conditioner condenser, clean it with water.

WASHING METHOD

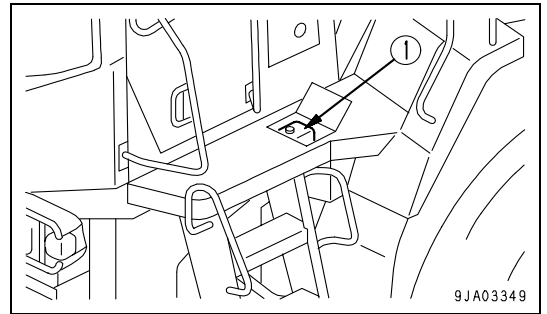
1. Open top cover (1) at the front of the engine hood.
2. Move radiator sub tank (2) to make space so that air conditioner condenser (3) can swing to the rear.
3. Remove 4 bolts (4) at the top of the condenser.
4. Using pin (5) at the bottom of the condenser as the fulcrum, push over to the rear.
5. Washer with water from the top.
6. Install bolts (4), then install sub tank (2) to its original position.



CHECK WINDOW WASHING FLUID LEVEL, ADD FLUID

Check the washing fluid levels in washer tank (1). When the fluid has run short, add automotive window washing fluid.

Be careful not to let dust get into the fluid.



CLEAN RADIATOR FINS AND COOLER FINS

WARNING

- Never open the engine side cover when the engine is running. Stop the engine completely before starting the cleaning operation.
- If compressed air, pressurized water, or steam hits your body directly, or causes dirt to fly, it may lead to personal injury. Always wear safety glasses, dust mask, or other protective equipment.

Clean the radiator or cleaner if mud or dirt is stuck to it.

CLEAN FINS BY ROTATING COOLING FAN IN REVERSE

NOTICE

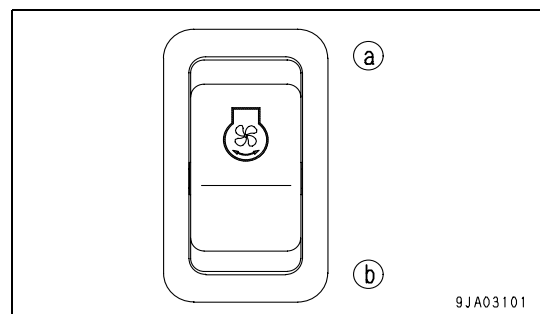
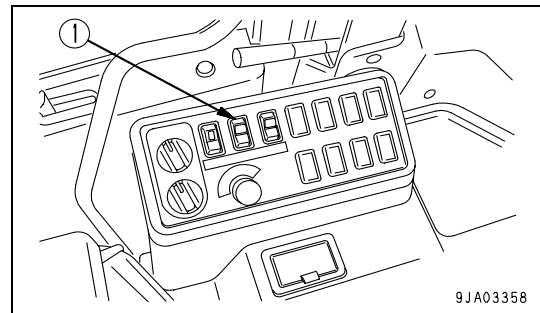
When rotating the fan in reverse, be careful of flying dust and take steps to prevent cloth or other objects from getting caught in the fan.

On jobsites where the dust accumulates on to the radiator or cooler, turn cooling fan reverse rotation switch (1) ON to rotate the fan in the reverse direction and blow out the dust stuck to the radiator or cooler. This can be used to extend the cleaning interval.

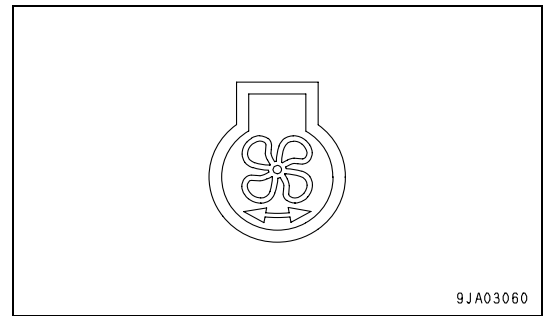
METHOD OF ROTATING FAN IN REVERSE

NOTICE

- When the engine is running, even if the switch is pressed, the direction of rotation of the fan does not change, but the cooling fan reverse rotation pilot lamp on the machine monitor flashes. Stop the engine, then operate the switch.
 - When the fan is rotating in reverse, the pilot lamp on the machine monitor lights up. Do not carry out operations while the pilot lamp is lighted up. The machine will be unable to display its performance fully and it may lead to overheating. For normal operations, always use the fan rotating in the normal direction.
 - If the engine has to be stopped when the fan is rotating in reverse, run the engine at low idling, then stop it.
1. Turn the starting switch to the OFF position and stop the engine.
 2. Turn the starting switch to the ON position.
 3. Set cooling fan reverse rotation switch (1) to position (a) (ON).



4. Check that the pilot lamp inside the switch and the cooling fan reverse rotation pilot lamp on the machine monitor are lighted up. At the same time, "COOLING FAN REVERSE" is displayed on the character display, and the fan is set to reverse rotation.
5. Turn the key in the starting switch to the START position and start the engine.
The cooling fan will rotate in reverse.

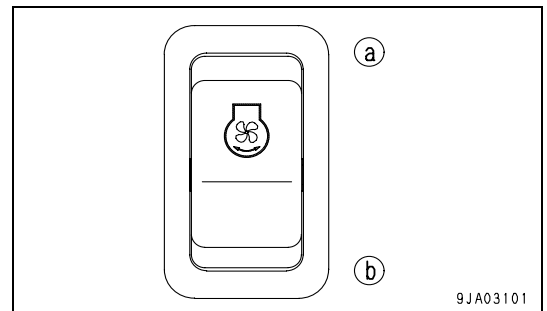
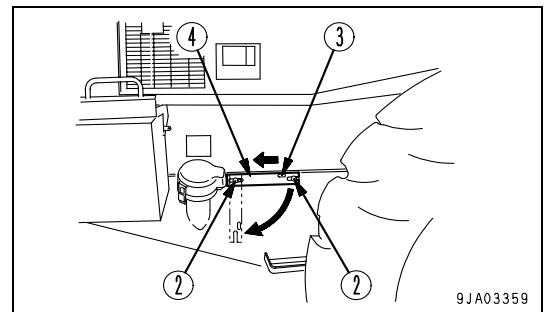


6. Run the engine at high idling.
Select the time for running the engine at high idling as follows according to the condition of clogging.
Normal clogging: 1 - 2 minutes
Excessive clogging: 2 - 3 minutes
7. After completing the cleaning, run the engine at low idling for approx. 10 seconds.
8. Turn the starting switch to the OFF position and stop the engine.
9. When the fan rotation stops, loosen wing bolts (2), use hook (3) to slide cleaning covers (4), and open the left and right covers.
10. Insert the air nozzle and blow the dirt out to the front of the machine.

REMARK

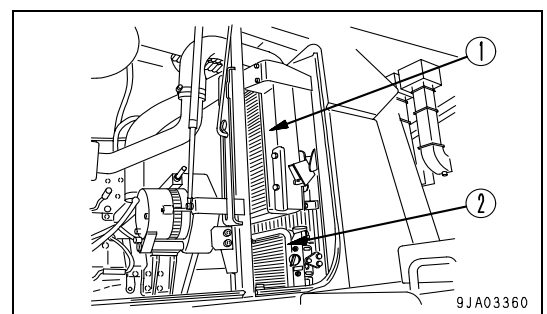
Steam or water can be used instead of compressed air.

11. After blowing out the dirt, install left and right cleaning covers (4).
12. Run the engine at low idling.
13. Turn the key in the starting switch to the OFF position and stop the engine.
14. Turn the starting switch key to the ON position.
15. Set cooling fan reverse rotation switch (1) to position (b) (OFF) to cancel the reverse rotation.
16. Check the rubber hose. Replace with a new one if the hose is found to have cracks or to be hardened by ageing.
Further, check hose clamps for looseness.



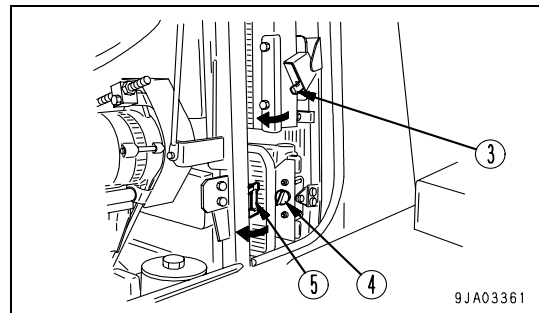
CLEAN FINS WITH COMPRESSED AIR

Tilt aftercooler (1) at the top front face of the radiator, swing oil cooler (2) at the bottom, then insert the steam jet nozzle through the gap and clean the fins.



METHOD OF TILTING AND SWINGING COOLER

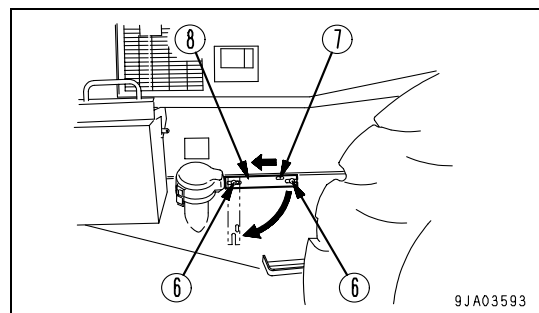
1. Turn the starting switch to the OFF position and stop the engine.
2. Pull lever (3) down to release the lock, then tilt aftercooler (1).
Turn the knob (4) counterclockwise to release the lock, then swing oil cooler (2).
If necessary, band (5) can be fitted to oil cooler (2) to hold it in position after swinging it.
3. Use the steam jet nozzle to blow out the mud, dirt, or leaves clogging the radiator fins or cooler fins.



NOTICE

If the steam jet nozzle is brought to close to the radiator fins, it may damage the fins, so keep the nozzle a suitable distance away from the fins when cleaning.

4. Check the rubber hose. Replace with a new one if the hose is found to have cracks or to be hardened by ageing.
Further, check hose clamps for looseness.
5. Do as follows to blow out the mud or dirt that has fallen to the bottom.
6. Loosen wing bolts (6), use hook (7) to slide cleaning covers (8), and open the left and right covers.
7. Insert the air nozzle and blow the dirt out to the front of the machine.



REMARK

Steam or water can be used instead of compressed air.

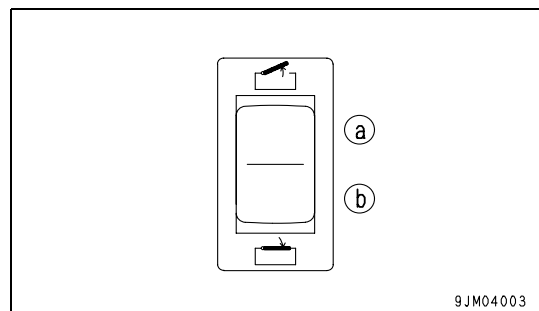
8. After blowing out the dirt, install left and right cleaning covers (8).
9. After completing the cleaning, push the bottom of aftercooler (1) to lock it, then push the front of oil cooler (2) to lock it.
Check that they are both securely locked in position.

AFTERCOOLER TILT SWITCH

(If equipped)

For machines with the optional equipment, Step 2 of the method for tilting and swinging the cooler can be used to tilt the aftercooler electrically.

Press aftercooler switch (2) on the left side of the engine room to tilt the aftercooler electrically approx. 17 degrees; press (b) to return the aftercooler to its original position.



CHECK ELECTRICAL INTAKE AIR HEATER

Before the start of the cold season (once a year), contact your Komatsu distributor to have the electrical intake air heater repaired or checked for dirt or disconnections.

REPLACE BOLT ON CUTTING EDGE

⚠ WARNING

It is extremely dangerous if the work equipment moves when carrying out the turning or replacement operation.

Set the work equipment in a stable position, stop the engine, then set the safety lock for the work equipment control lever securely to the LOCK position.

Turn or replace the cutting edge before the wear reaches the edge of the bucket.

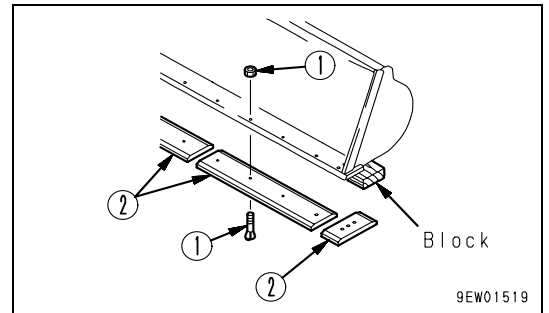
1. Raise the bucket to a suitable height, then put blocks under the bucket to prevent the bucket from coming down.

Raise the bucket so that the bottom surface of the bucket is horizontal.

2. Remove nuts and bolts (1), then remove cutting edge (2).
3. Clean the mounting surface of cutting edge (2).
4. Turn cutting edge (2) and install it to the bucket. When turning the edge, install it to the opposite side (left edge to right side, right edge to left side).

If both sides of the cutting edge are worn, replace with a new part.

If the wear extends to the mounting surface, repair the mounting surface before installing the cutting edge.



5. Tighten nuts and bolts 1 uniformly so that there is no gap between the bucket and cutting edge.

Tightening torque for mounting bolt:

745 ± 108 N²m (76 ± 11 kgf²m, 549.7 ± 79.6 lbf²)

6. Tighten the mounting bolts again after operating for several hours.

REPLACE BUCKET TEETH

(If equipped)

WARNING

- If the pin is hit out with strong force, there is danger that the pin may fly out. Check that there is no one in the surrounding area.
- There is danger of pieces flying during the replacement operation, so always wear protective clothing, such as safety glasses and gloves.

When the bucket teeth are worn, replace them as follows.

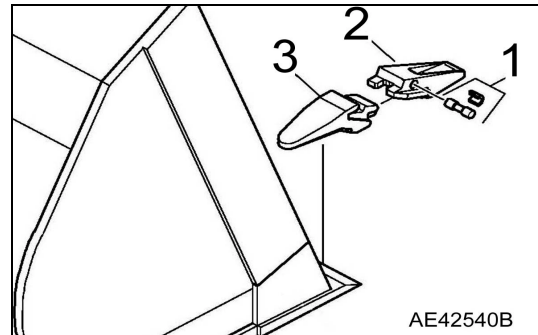
1. Raise the bucket to a suitable height, then put blocks under the bucket to prevent the bucket from coming down.

Raise the bucket so that the bottom surface of the bucket is horizontal.

2. Remove the bolt and nuts (1) and (2), then remove bucket tooth (3).
3. Clean the installation surface of bucket tooth (3).
4. Install new teeth to the bucket.

When doing this, insert shims so that there is no clearance between the teeth and the top surface of the bucket.

Continue to add shims until it becomes impossible to add a 0.5 mm (0.02 in) shim.



If the mounting surface is worn, correct the mounting surface before installing the teeth.

5. To prevent any gap from forming between the teeth and tip of the bucket, tighten bolts and nuts (1) and (2) temporarily, then hit the tip of the teeth with a hammer.

Tightening torque of mounting bolt (1):

$902 \pm 39 \text{ N}^2\text{m}$ ($92 \pm 4 \text{ kgf}^2\text{m}$, $665.4 \pm 28.9 \text{ lbft}$)

Tightening torque of mounting bolt (2):

$902 \pm 39 \text{ N}^2\text{m}$ ($92 \pm 4 \text{ kgf}^2\text{m}$, $665.4 \pm 28.9 \text{ lbft}$)

6. After operating the machine for a few hours, tighten the mounting bolts again.

CHECK AIR CONDITIONER

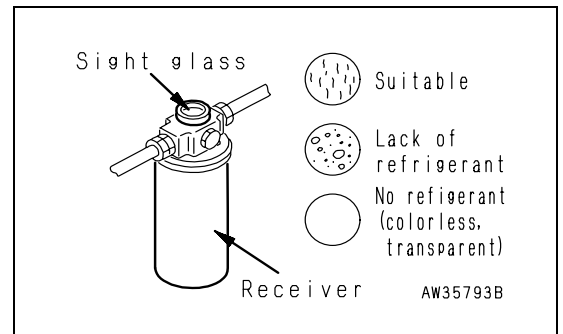
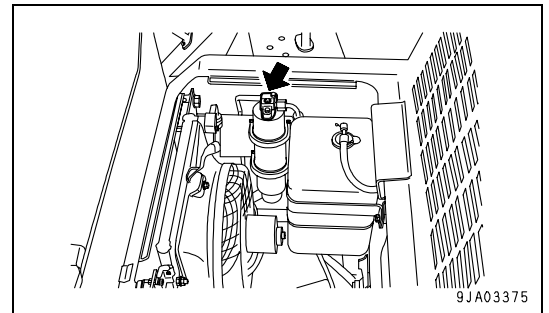
CHECK LEVEL OF REFRIGERANT(GAS)

⚠ WARNING

If the refrigerant used in the cooler gets into your eyes or on your hands, it may cause loss of sight or frostbite. Do not touch the refrigerant. Never loosen any part of the refrigerant circuit.
Do not bring any flame close to any point where the refrigerant gas is leaking.

If there is a lack of refrigerant (gas), the cooling performance will be poor. When operating the cooler at high speed with the engine at full throttle, use the receiver sight glass (inspection window) to check the condition of the refrigerant gas (Freon R134a) flowing in the refrigerant circuit.

- No bubbles in refrigerant flow: Suitable
- Some bubbles in flow (bubbles pass continuously): Lack of refrigerant
- Colorless, transparent: No refrigerant



REMARK

When there are bubbles, the refrigerant gas level is low, so contact your refrigerant dealer to have refrigerant added. If the air conditioner is run with the refrigerant gas level low, it will cause damage to the compressor.

OPERATING THE AIR CONDITIONER OFF SEASON

Even during the off-season, run the compressor at low speed for 3 to 5 minutes once a month to prevent the loss of the oil film at the lubricated parts of the compressor.

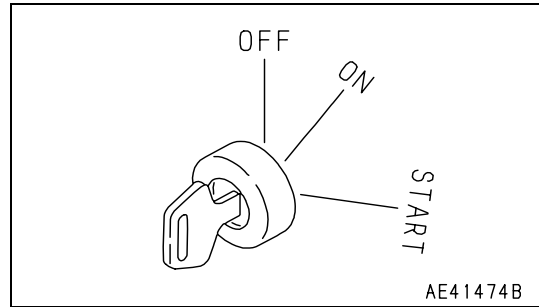
REPLACE SLOW BLOW FUSE

NOTICE

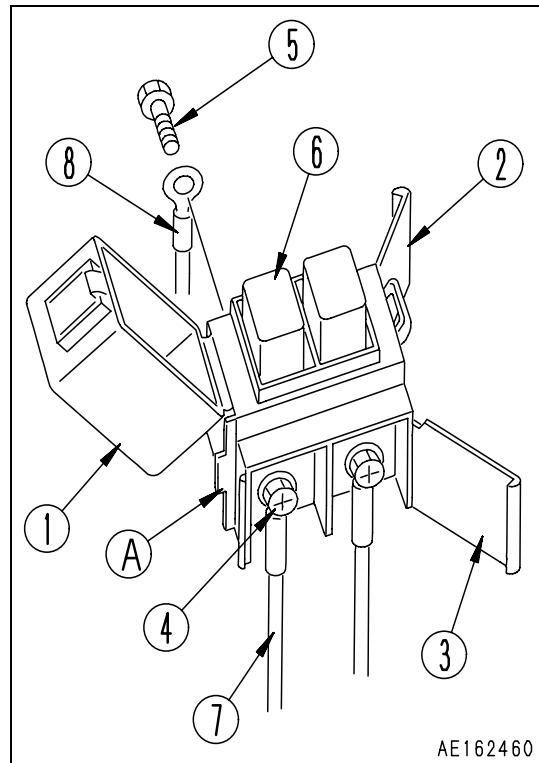
- Always turn the power OFF when replacing the slow blow fuse (turn the starting switch to the OFF position).
- Always replace the slow blow fuse with a fuse of the same capacity.

1. Turn the starting switch to the OFF position.
2. Remove the slow blow fuse box from the chassis.

3. Open covers (1), (2), and (3) of the slow blow fuse box. Covers (2) and (3) can be removed easily by using protrusion (A) on the body as a fulcrum and levering the catch of the cover with a flat-headed screwdriver to release it.
4. Loosen screws (4) and (5), and remove. When screws (4) and (5) are removed, slow blow fuse 6 will also come off together with electric wiring (7) and (8).
5. Using screws (4) and (5), install a new slow blow fuse together with electric wiring 7 and 8 to the slow blow fuse box, then close covers (1), (2), and (3).
6. Install the slow blow fuse box to the chassis.



AE41474B



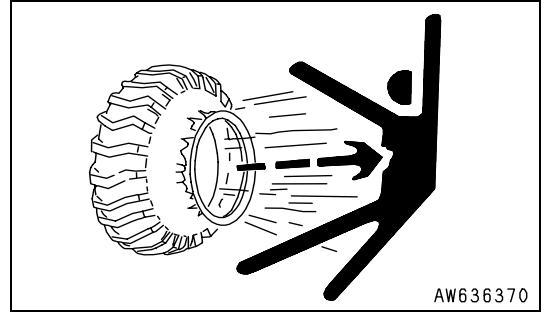
AE162460

SELECTION AND INSPECTION OF TIRES

⚠ WARNING

If a tire or a rim is handled wrongly, the tire may burst or may be damaged and the rim may be broken and scattered, and that can cause serious injury and death.

- Since maintenance, disassembly, repair and assembly of the tires and rims require special equipment and skill, be sure to ask a tire repair shop to carry out the work.
- Do not heat or weld the rim to which the tire is installed. Do not make a fire near the tire.



SELECTION OF TIRES

⚠ WARNING

Select the tires according to the conditions of use and attachments on the machine. Use only specified tires and inflate them to the specified pressure.

Select the tires according to the conditions of use and attachments of the machine. Use the following table. Since the indicated speed varies with the tire size, consult your Komatsu distributor when using optional tires.

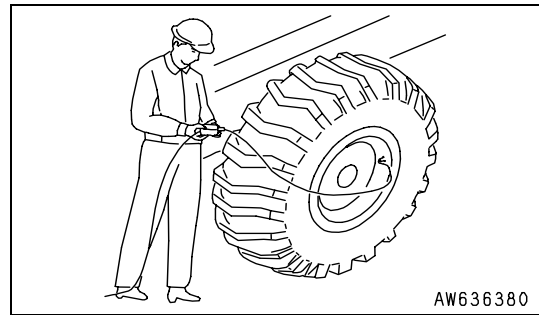
		Maximum load [kg (lb)]	Tire size	Remarks
Standard	Front wheel	10,760 (23726)	23.5-25-20PR (L3 Rock)	
	Rear wheel	10,760 (23726)	23.5-25-20PR (L3 Rock)	
If equipped	Front wheel	11,140 (24564)	26.5-25-16PR (L3 Rock)	
	Rear wheel	11,140 (24564)	26.5-25-16PR (L3 Rock)	
	Front wheel	12,690 (27981)	26.5-25-20PR (L3 Rock)	
	Rear wheel	11,140 (24564)	26.5-25-20PR (L3 Rock)	

CHECK OF INFLATION OF PRESSURE OF TIRES AND INFLATION OF THEM

⚠ WARNING

When inflating a tire, check that no one will enter the working area and use an air chuck which has a clip and which can be fixed to the air valve.

- While inflating the tire, check the inflation pressure occasionally so that it will not rise too high.
- If the rim is not fitted normally, it may be broken and scattered while the tire is inflated. To ensure safety, place a guard around the tire and do not work in front of the rim but work on the tread side of the tire.
- Abnormal drop of inflation pressure and abnormal fitting of the rim indicate a trouble in the tire or rim. In this case, be sure to ask a tire repair shop to carry out repairs.
- Be sure to observe the specified inflation pressure.
- Do not adjust the inflation pressure of the tires just after high-speed travel or heavy-duty work.



Check

Measure the inflation pressure with a tire pressure gauge while the tires are cool before starting work.

Inflation of tires

Adjust the inflation pressure properly.

When inflating a tire, use an air chuck which can be fixed to the air valve of the tire as shown in the figure. Do not work in front of the rim but work on the tread side of the tire.

The proper inflation pressure is shown below.

Tire size	Inflation pressure
23.5-25-20PR (L3 Rock) (standard)	Front Tire: 0.39MPa (4.0kgf/cm ² , 56.8 PSI) Rear Tire: 0.31MPa (3.2kgf/cm ² , 45.44 PSI)
26.5-25-16PR (L3 Rock) (if equipped)	Front Tire: 0.34MPa (3.5 kgf/cm ² , 49.7 PSI) Rear Tire: 0.29MPa (3.0 kgf/cm ² , 42.6 PSI)
26.5-25-20PR (L3 Rock) (if equipped)	

NOTICE

The optimum inflation pressure differs according to the type of work. For details, see "HANDLING THE TIRES (3-115)" .

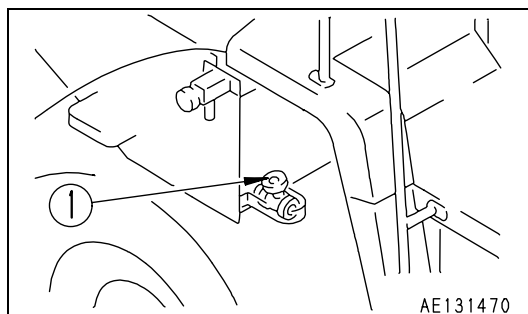
CHECK BEFORE STARTING

For the following items, see "CHECK BEFORE STARTING (3-69)".

- Checking with machine monitor
- Check coolant level, add water
- Check oil level in engine oil pan, add oil
- Check fuel level, add fuel
- Check electrical wiring
- Check parking brake
- Check brake pedal
- Check tire inflation pressure

EVERY 50 HOURS SERVICE**DRAIN WATER, SEDIMENT FROM FUEL TANK**

Loosen valve (1) on the right side of the tank so that the sediment and water will be drained together with fuel.



EVERY 100 HOURS SERVICE

Maintenance for every 50 hours service should be carried out at the same time.

CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL

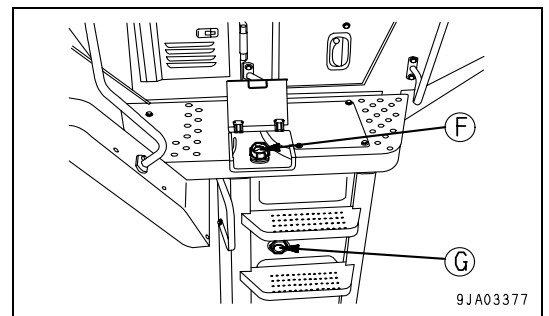
⚠ WARNING

- The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

1. Lower the bucket horizontally to the ground and stop the engine.
 Wait for 5 minutes, then check sight gauge (G). The oil level should be between the H and L marks.

NOTICE

Do not add oil if the level is above the H line. If the oil has been added to above H level, stop the engine and wait for the hydraulic oil to cool down, then drain the excess oil from the drain plug. If the oil is above H level, it will damage the hydraulic circuit or cause the oil to spurt out.



2. If the oil is below the L level, open the inspection cover above the step and add oil through oil filler port (F).

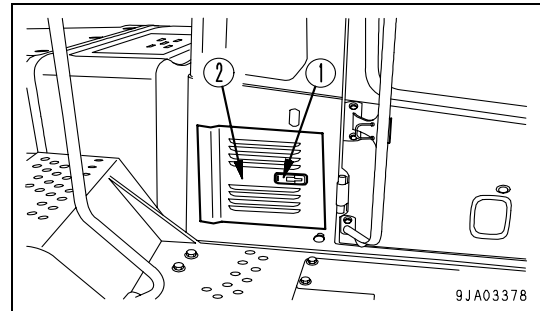
CLEAN ELEMENT IN AIR CONDITIONER FRESH AIR FILTER

⚠ WARNING

If compressed air is used, there is danger that dirt may fly and cause personal injury. Always wear safety glasses, dust mask, and other protective equipment.

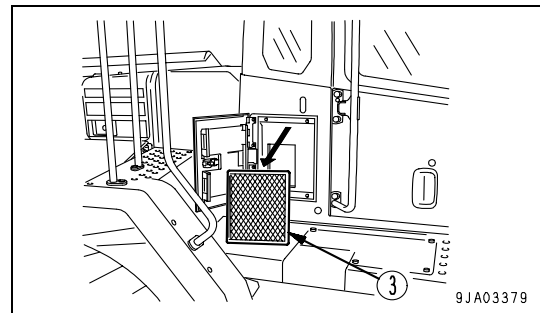
If the air conditioner has been used, the air filter should be cleaned. Stop the air conditioner before cleaning the element.

1. Push handle (1) and open cover (2).



2. Remove element (3) and clean it.

3. Direct dry compressed air (less than 0.69 MPa (7 kgf/cm², 99.4 PSI)) to the element from inside along its folds, then direct it from outside along its folds and again from inside.



EVERY 250 HOURS SERVICE

Maintenance for every 50 and 100 hours service should be carried out at the same time.

CHECK ENGINE ELECTROLYTE LEVEL

Carry out this check before operating the machine.

⚠ WARNING

- Do not use the battery if the battery electrolyte level is below the LOWER LEVEL line. This will accelerate deterioration of the inside of the battery and reduce the service life of the battery. In addition, it may also cause an explosion.
- The battery generates flammable gas and there is danger of explosion, so do not bring fire or sparks near the battery.
- Battery electrolyte is dangerous. If it gets in your eyes or on your skin, wash it off with large amount of water and consult a doctor.
- When adding distilled water to the battery, do not allow the battery electrolyte to go above the UPPER LEVEL line. If the electrolyte level is too high, it may leak and cause damage to the paint surface or corrode other parts.

NOTICE

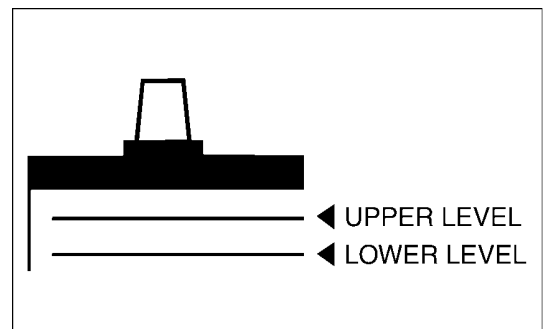
When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.

Inspect the battery electrolyte level at least once a month and follow the basic safety procedures given below.

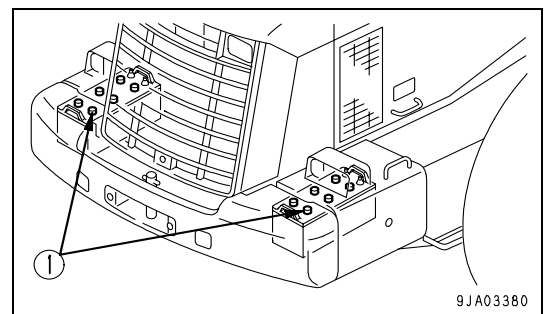
WHEN CHECKING ELECTROLYTE LEVEL FROM SIDE OF BATTERY

If it is possible to check the electrolyte level from the side of the battery, check as follows.

1. Open the cover of the battery box.
There are two battery boxes: One on each side at the rear of the machine.
2. Use a wet cloth to clean the area around the electrolyte level lines and check that the electrolyte level is between the UPPER LEVEL (U.L) and LOWER LEVEL (L.L) lines.
If the battery is wiped with a dry cloth, static electricity may cause a fire or explosion.



3. If the electrolyte level is below the midway point between the U.L and L.L lines, remove cap (1) and add distilled water to the U.L line.
4. If distilled water has been added to any cell of cap (1), add distilled water also to the other cells.
5. Clean the vents of the battery caps, then close the caps securely.
Keep the top of the battery clean and wipe it with a wet cloth.



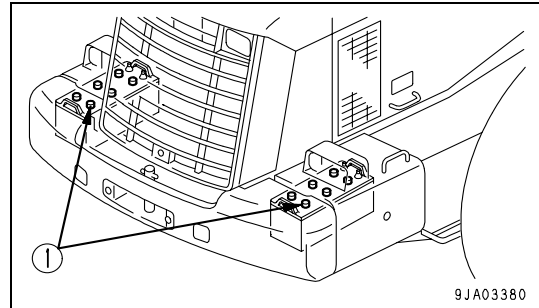
REMARK

If distilled water is added to above the U.L line, use a pipette to lower the level to the U.L line. Neutralize the removed fluid with baking soda (sodium bicarbonate), then flush it away with a large amount of water or consult your Komatsu distributor or battery maker.

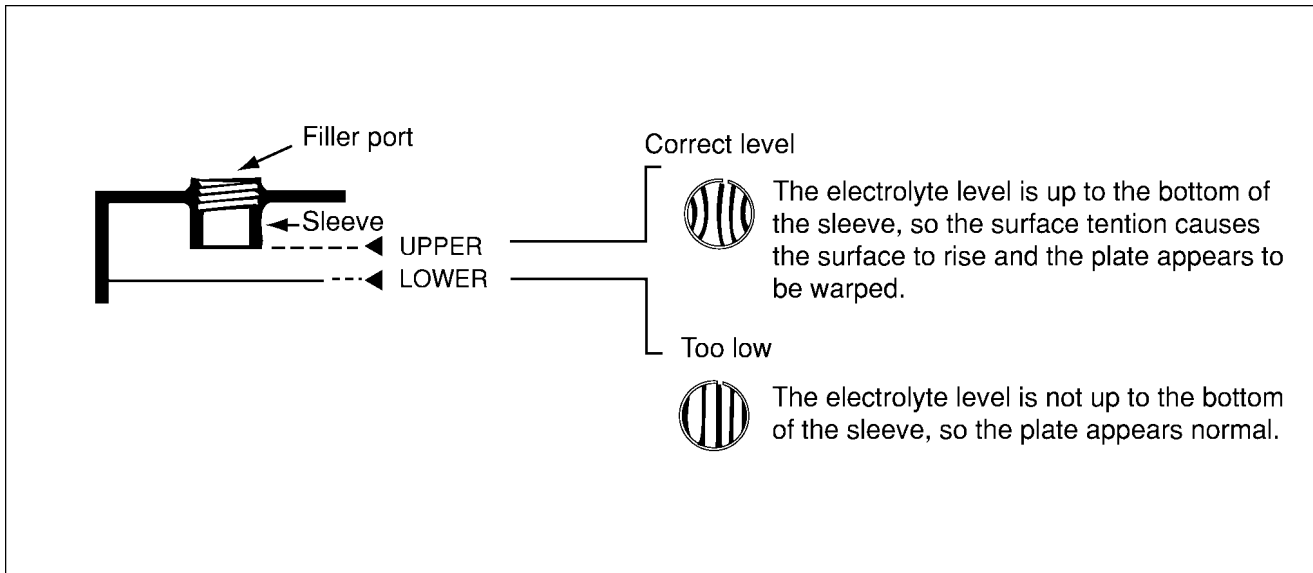
WHEN IT IS IMPOSSIBLE TO CHECK ELECTROLYTE LEVEL FROM SIDE OF BATTERY

If it is impossible to check the electrolyte level from the side of the battery, or there is no display of the UPPER LEVEL line on the side of the battery, check as follows.

1. Open the cover of the battery box.
There are two battery boxes: One on each side at the rear of the machine.
2. Remove cap (1) at the top of the battery, look through the water filler port, and check the electrolyte surface. If the electrolyte does not reach the sleeve, add distilled water so that the level reaches the bottom of the sleeve (UPPER LEVEL line) without fail.
3. If distilled water has been added to any cell of cap (1), add distilled water also to the other cells.



Use the diagram below for reference, and check if the electrolyte reaches the bottom of the sleeve.



4. After adding distilled water, tighten cap (1) securely.

REMARK

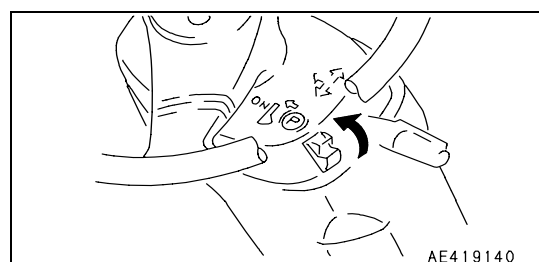
If distilled water is added to above the bottom of the sleeve, use a pipette to lower the level to the bottom of the sleeve. Neutralize the removed fluid with baking soda (sodium bicarbonate), then flush it away with a large amount of water or consult your Komatsu distributor or battery maker.

WHEN IT IS POSSIBLE TO USE INDICATOR TO CHECK ELECTROLYTE LEVEL

If it is possible to use an indicator to check the electrolyte level, follow the instructions given.

CHECK PARKING BRAKE

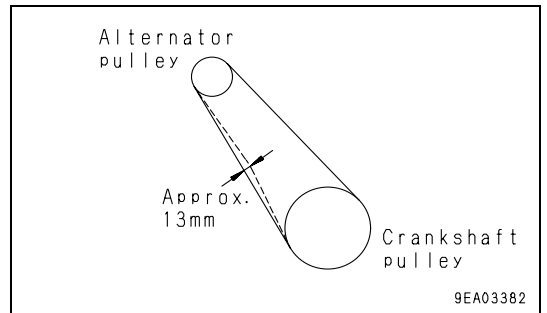
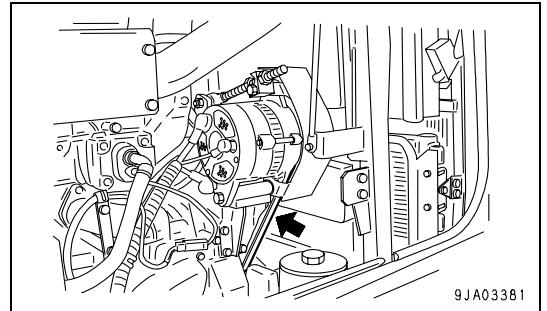
1. Set the machine on a dry downhill slope, press the parking brake switch to the ON position, and check if the parking brake holds the machine in position.
2. If any abnormality is found, please contact your Komatsu distributor.



CHECK ALTERNATOR BELT TENSION, ADJUST

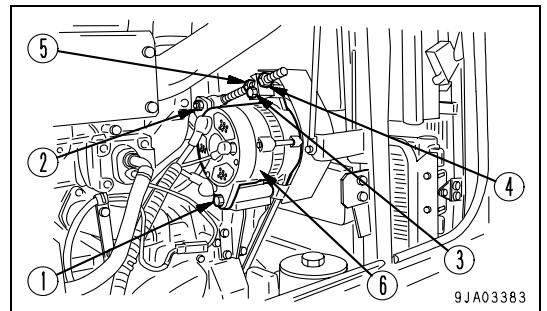
CHECKING

The standard deflection between the alternator pulley and crank pulley when pressed with a thumb (approx. 59N (6 kgf)) should be approx. 13 mm (0.5 in).



ADJUSTING

1. Loosen bolts and nuts (1), (2), (3), and (4).
2. Turn nut (5) clockwise and move alternator (6) so that the deflection of the belt is approx. 13 mm (0.5 in)(approx. 59N (6 kgf)).
3. Tighten bolts and nuts (1), (2), (3), and (4) to hold alternator (6) in position.
4. Check each pulley for damage, wear of the V-groove, and wear of the V-belt. Be particularly careful to check that the V-belt is not in contact with the bottom of the V-groove.



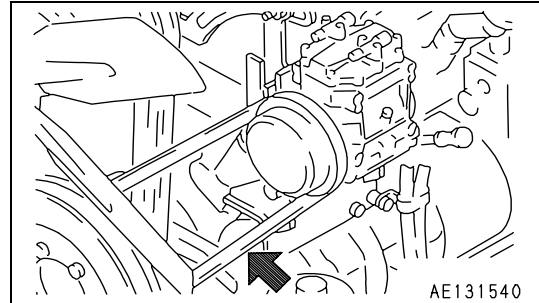
5. If the belt has elongated and there is no more allowance for adjustment, or if the belt is cut or cracked, replace the belt.
6. After replacing the belt, operate for one hour, then adjust again.

CHECK AIR CONDITIONER COMPRESSOR BELT TENSION, ADJUST

CHECKING

The standard deflection between the air conditioner compressor pulley and crank pulley when pressed with a thumb (approx. 98N (10 kgf)) should be approx. 16 - 20 mm (0.6 - 0.8 in).

When a belt tension gauge is used, the standard tension is within a range of 353 - 530N (36 - 54 kgf).



CHECK WHEN CHANGING THE V-BELT

The standard deflection between the air conditioner compressor pulley and fan pulley when pressed with a thumb (approx. 98N (10 kgf)) should be approx. 12 - 17 mm (0.5 - 0.7 in).

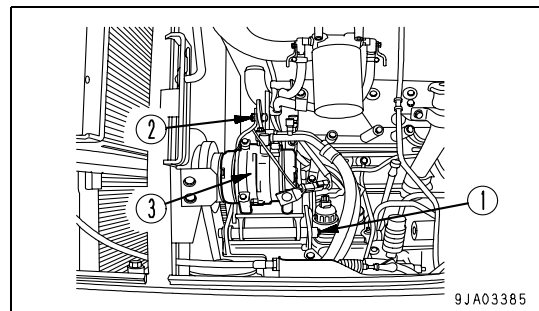
When a belt tension gauge is used, the standard tension is within a range of 530 - 745N (54 - 76 kgf).

REMARK

When the belt has been replaced with a new part, a high tension is necessary, so the initial tension is in the value given above.

ADJUSTING

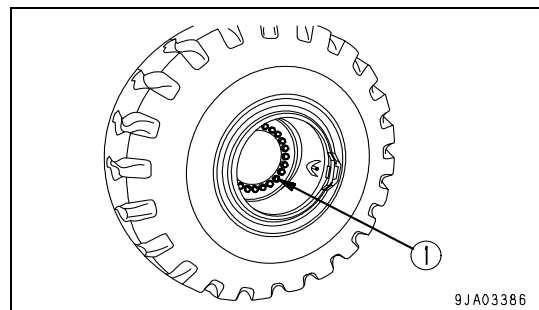
- Loosen nuts (1) and (2), and move compressor (3) to adjust.
- Tighten nuts (1) and (2) to hold compressor (3) in position.
- Check each pulley for damage, wear of the V-groove, and wear of the V-belt. Be particularly careful to check that the V-belt is not in contact with the bottom of the V-groove.
- Replace the V-belt if it has stretched, leaving no allowance for adjustment, or if the belt is cut or cracked.
If the V-belt has been replaced with a new part, there will be initial elongation, so inspect and adjust it again after one-hour of operation.



CHECK FOR LOOSE WHEEL HUB NUTS, TIGHTEN

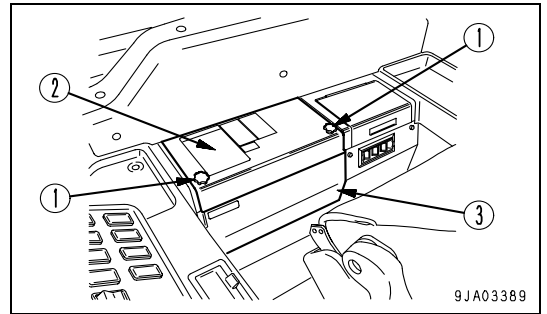
If wheel hub nuts (1) are loose, tire wear will be increased and accidents may be caused.

- Check for loose nuts, and tighten if necessary.
When checking for loose nuts, always turn the nuts in the direction of tightening to check.
Tightening torque: 825 to 1030 N²m
(84 to 105 kgf²m, 607.6 to 759.9 lbf²)
- If any stud bolt is broken, replace all the stud bolts for that wheel.

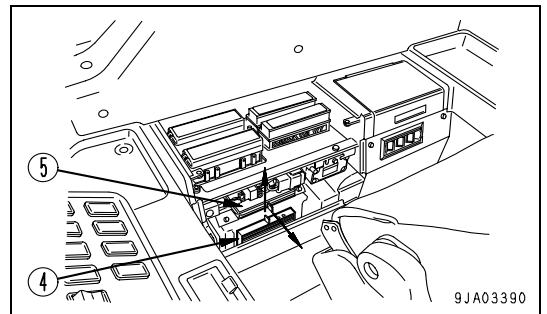


CLEAN ELEMENT IN AIR CONDITIONER RECIRCULATION FILTER

1. Loosen knob (1), remove filter inspection cover (2), then open filter inspection cover (3).



2. Pull out filters (4) and (5) in the direction of the arrow.
3. Clean with compressed air in the same way as for the fresh air filter.
If the filter is extremely dirty, rinse it in water.
After rinsing the filter, dry it completely before installing it again.



EVERY 500 HOURS SERVICE

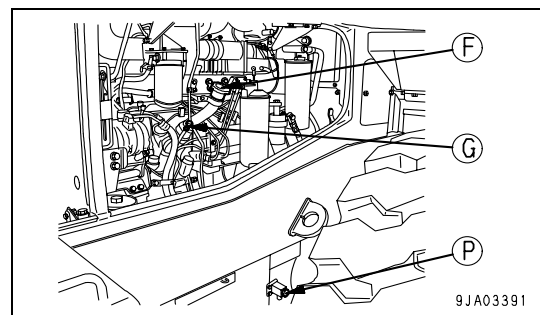
Maintenance for every 50, 100 and 250 hours service should be carried out at the same time.

CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE**⚠ WARNING**

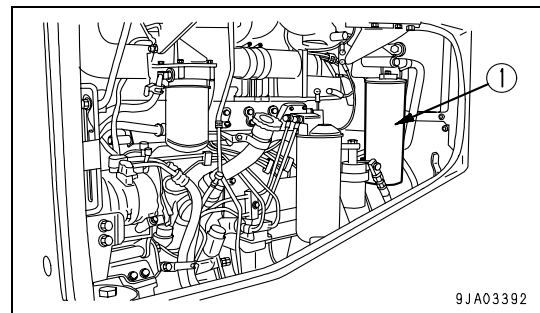
- The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

- Container to catch drained oil: Min 38 liters (10.04 US gal) capacity
- Refill capacity: 38 liters (10.04 US gal)
- Filter wrench

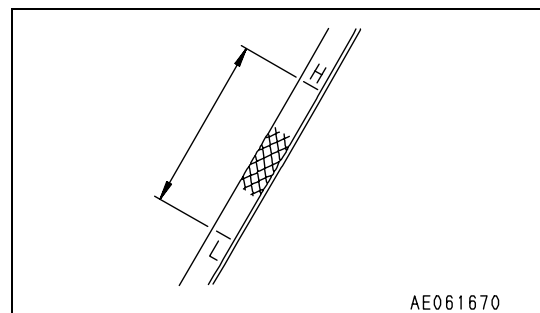
1. Open the engine side cover on the right side of the chassis.
2. Open oil filler (F).
3. Place a container to catch the oil under drain plug (P).
4. Loosen drain plug (P), and drain the oil.
5. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.
6. Install drain plug (P).



7. Using the filter wrench, turn filter cartridge (1) counterclockwise to remove it.
In particular, if this operation is carried out immediately after stopping the engine, a large amount of oil will come out, so wait for 10 minutes before starting the operation.
8. Clean the filter holder, fill the new filter cartridge with engine oil, then coat the seal and thread of the filter cartridge with engine oil (or coat thinly with grease) and install.
9. When installing, bring the seal surface into contact with the filter holder, then tighten a further 3/4 to 1 turns.



10. After replacing the filter cartridge, add engine oil through oil filler (F) until the oil level is between the H and L marks on the dipstick (G).
11. Run the engine at idling for short time, then stop the engine, and check the oil is between the H and L marks on the dipstick. For details, see "CHECK OIL LEVEL IN ENGINE OIL PAN, ADD OIL (3-71)".



REPLACE FUEL FILTER CARTRIDGE

⚠ WARNING

- Immediately after the engine is stopped, all parts are at high temperature, so do not replace the filter immediately.
- Wait for the engine to cool down before starting the operation.
- The inside of fuel piping system of the engine is under high-pressure when the engine is running. When replacing the filter, wait for at least 30 seconds after the engine stops to let the internal pressure go down before replacing the filter.
- Do not bring any fire or spark close.
- This engine consists of higher precision parts than on the conventional fuel injection pump and nozzle, so if dirt gets in, it will cause problems. If there is any dirt stuck to the fuel line, use fuel to wash it off completely.
- Always use a Komatsu genuine part for the fuel filter cartridge. If filters other than genuine filters are used, problems may occur in the injection system, so never use substitute parts.
- Be careful when opening the air bleed plug at the fuel filter head and the air bleeder of the supply pump. The system is still under pressure and fuel may spurt out.

- Container to catch the oil
- Filter wrench

1. Set the container to catch the fuel under the filter cartridge.
2. Using a filter wrench, turn filter cartridge (1) counterclockwise to remove it.
3. Clean the filter head, fill the new filter cartridge with clean fuel, coat the packing surface thinly with engine oil, and install it to the filter holder.

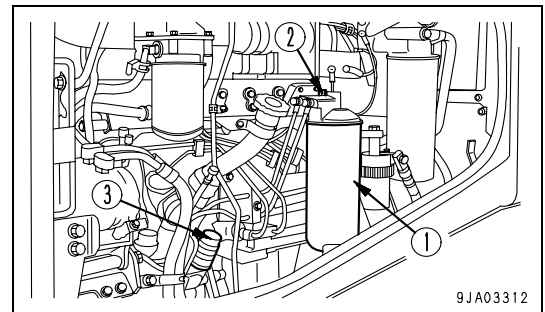
Always use clean fuel when filling with fuel, and be careful not to let any dirt or dust get in.

Add fuel from small hole (A) (dirty side) at eight places. Do not add fuel from hole (B) (clean side) at the center.

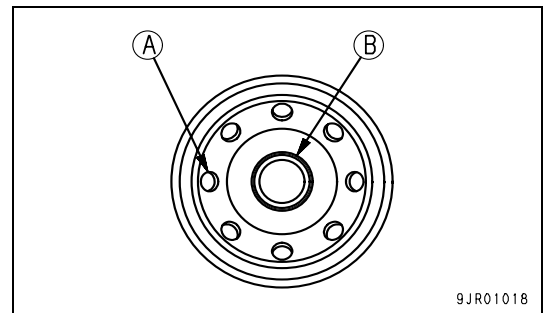
4. When installing, tighten until the packing surface contacts the seal surface of the filter holder, then tighten it up 1/2 to 3/4 of a turn.

If the filter cartridge is tightened too far, the packing will be damaged and this will lead to leakage of fuel. If the filter cartridge is too loose, fuel will also leak from the packing, so always tighten to the correct amount.

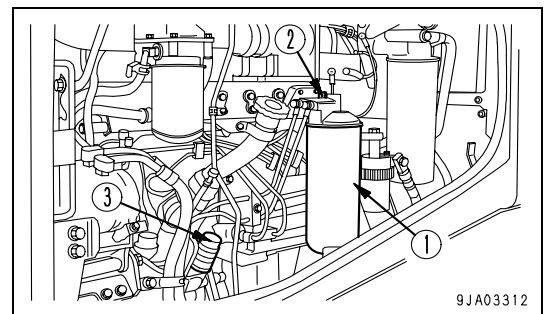
5. After replacing filter cartridge (1), loosen air bleed plug (2).
6. Loosen the knob of priming pump (3), then pump the knob until no more bubbles come out of air bleed plug (2).
7. Tighten air bleed plug (2).
Tightening torque: 7.8 to 9.8 N²m (0.8 to 1 kgf²m, 5.8 to 7.2 lbft)



9JA03312

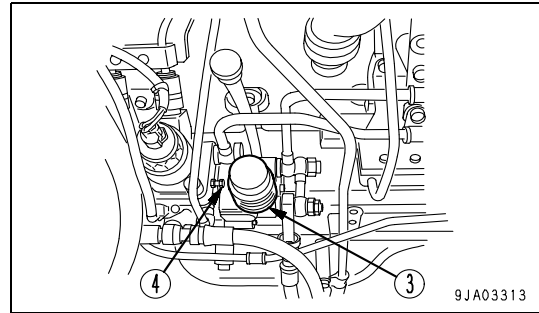


9JR01018



9JA03312

8. Loosen air bleeder (4) of the supply pump.
9. Pump priming pump (3) until no more bubbles come out with the fuel from air bleeder (4), then tighten air bleeder (4). Tightening torque: 4.9 to 6.9 N²m (0.5 to 0.7 kgf²m, 3.6 to 5.1 lbft)



10. Continue pumping (approx. 50 times) until the priming pump (3) becomes stiff and the overflow valve release sound becomes continuous.
11. Push the knob of priming pump (3) in and tighten it.
12. After replacing the filter cartridge, start the engine and check that there is no leakage of fuel from the filter seal surface. If there is any leakage of fuel, check the tightening of the filter cartridge. If there is still leakage of fuel, follow Step 1 and 2 to remove the filter cartridge, then check the packing surface for damage or foreign material. If any damage or foreign material is found in the packing, replace the cartridge with a new part, then repeat Steps 3 - 12 to install the filter cartridge.

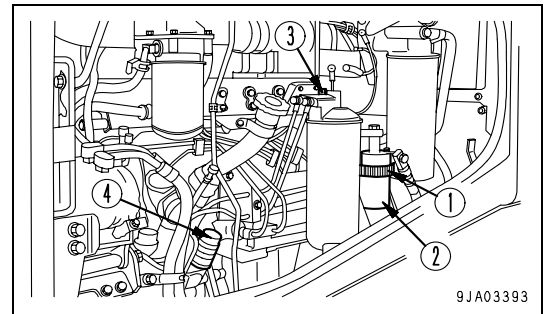
CLEAN FUEL STRAINER

⚠ WARNING

- After the engine is stopped, all parts are at high temperature, so do not replace the strainer immediately. Wait for the parts to cool down before carrying out the replacement.
- The engine fuel piping line is under high pressure when the engine is running. When replacing the strainer, wait for at least 30 seconds after stopping the engine to let the internal pressure go down before replacing the strainer.
- Never bring any flame close.
- This engine consists of higher precision parts than on the conventional fuel injection pump and nozzle, so if dirt gets in, it will cause problems. If there is any dirt stuck to the fuel line, use fuel to wash it off completely.

- Container to catch the oil
- Filter wrench

1. Set the container under the fuel strainer to catch the fuel.
2. Using the filter wrench, turn ring (1) to the left to loosen it, then remove element cup (2) and the element.
3. Wash the element and the inside of element cup (2) with clean fuel.
4. Clean the strainer head, fill the element cup with clean fuel, coat the packing surface thinly with engine oil, then install to the head, taking care not to damage the O-ring. Always use clean fuel when filling the element cup and be careful not to let any dirt or dust get in.



9JA03393

5. When installing, turn ring (1) to the right to tighten it.
Tightening torque: 23 to 27 N²m (2.3 to 2.7 kgf²m, 16.6 to 19.5 lbft)
If the ring is loose, it will cause leakage of fuel, so always tighten it to the specified torque.
6. After installing element cup (2), bleed the air as follows.
7. Loosen air bleed plug (3) of the fuel filter.
8. Loosen the knob of priming pump (4), then pump it up and down until no more bubbles come out with the fuel from air bleed plug (3).
9. Tighten air bleed plug (2).
Tightening torque: 7.8 to 9.8 N²m
(0.8 to 1 kgf²m, 5.8 to 7.2 lbft)
10. Push in the knob of priming pump (4) and tighten it.

EVERY 1000 HOURS SERVICE

Maintenance for every 50, 100, 250 and 500 hours service should be carried out at the same time.

CHANGE OIL IN TRANSMISSION CASE AND TRANSMISSION OIL FILTER CARTRIDGE, CLEAN STRAINER

WARNING

- The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

- Container to catch drained oil: Min 60 liters (15.85 US gal) capacity
- Refill capacity: 54 liters (14.27 US gal)
- Filter wrench

1. Set a container to catch the oil under drain plug (P), then remove drain plug (P) and drain the oil.

To prevent the oil from pouring out suddenly, loosen drain plug (P) and remove it gradually.

2. After draining the oil, install drain plug (P).

Tightening torque: $68.6 \pm 9.8 \text{ N}^2\text{m}$ ($7.0 \pm 1.0 \text{ kgf}^2\text{m}$, $50.6 \pm 7.2 \text{ lbft}$)

3. Set a container to catch the oil under the transmission filter.

4. Remove drain plug (1) of the transmission filter, drain the oil, then tighten the plug again.

5. Using a filter wrench, turn filter cartridge (2) to the left to remove it.

6. Clean in the filter holder, coat the seal surface and thread of the new filter cartridge with engine oil, then install it.

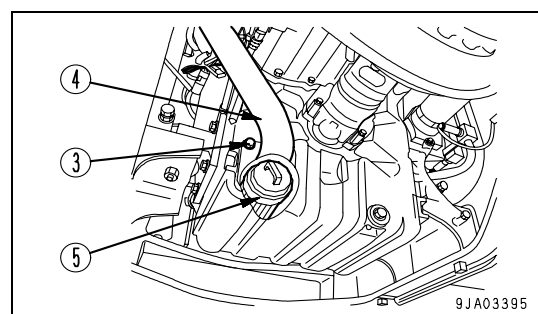
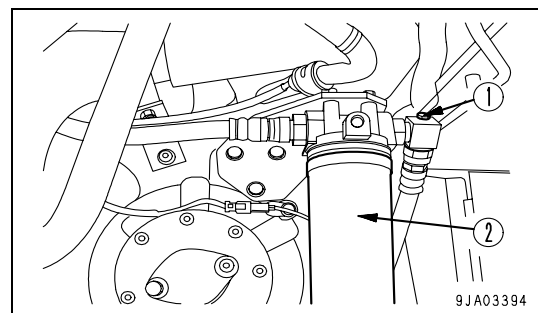
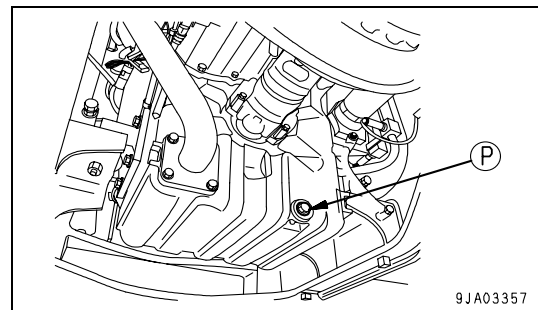
7. When the seal surface comes into contact with the filter holder, tighten a further 2/5 turns with the filter wrench.

8. Remove 4 bolts (3), move tube (4), then remove strainer (5).

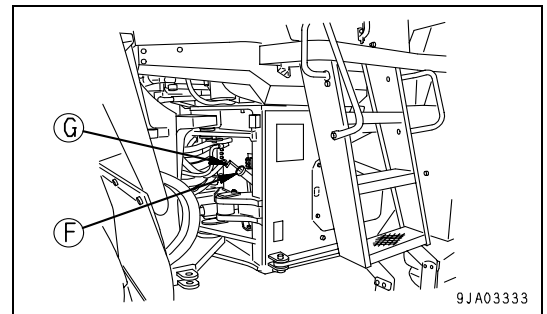
9. Remove any dirt stuck to strainer (5), then wash it in clean diesel fuel or flushing oil. If strainer (5) is damaged, replace it with a new part.

10. Install strainer (5) in the case.

Replace the O-ring of tube (4) with a new part, then install tube (4).

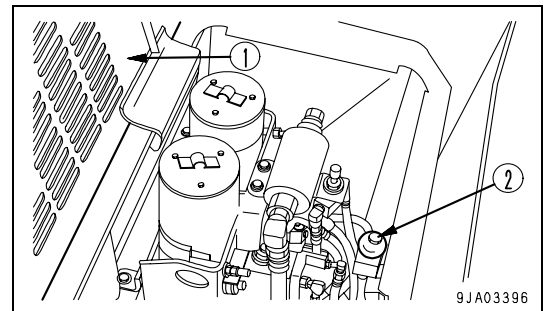


11. Pour in the specified amount of engine oil from oil filler (F).
12. After filling with oil, check that the oil is at the specified level.
For details, see "CHECK TRANSMISSION OIL LEVEL, ADD OIL (4-24)".
13. Check that there is no leakage of oil from the transmission case or oil filter.



CLEAN TRANSMISSION CASE BREATHER

1. Open cover (1) on the cab side of the engine hood.
2. Remove the mud and dirt from around the breather, then remove breather (2), soak it in washing liquid and wash it.
After removing the breather, take steps to prevent dirt or dust from entering the mount.



CHECK TIGHTENING PARTS OF TURBOCHARGER

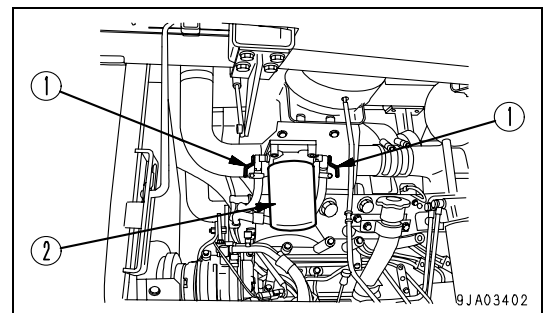
Please contact your Komatsu distributor to have the tightening portions checked.

CHECK PLAY OF TURBOCHARGER ROTOR

Please contact your Komatsu distributor to have the rotor play checked.

REPLACE CORROSION RESISTOR CARTRIDGE

1. Set 2 levers (1) at the top of the corrosion resistor to the side to the CLOSED position.
2. Using a filter wrench, turn cartridge (2) to the left to remove it.
3. Apply engine oil to the sealing surface of a new cartridge, then install it to the filter holder.
4. Bring the packing surface into contact with the seal surface of the filter holder, then tighten a further approx. 2/3 turns.
5. Set 2 levers (1) vertically to the OPEN position.



EVERY 2000 HOURS SERVICE

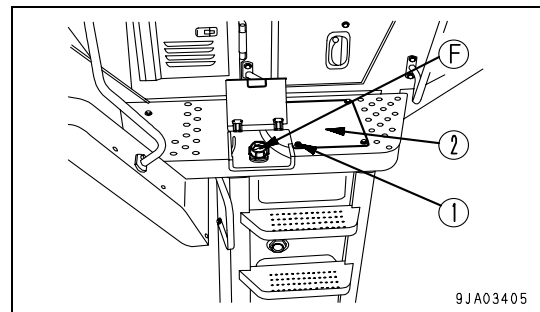
Maintenance for every 50, 100, 250, 500 and 1000 hours service should be carried out at the same time.

CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT**⚠ WARNING**

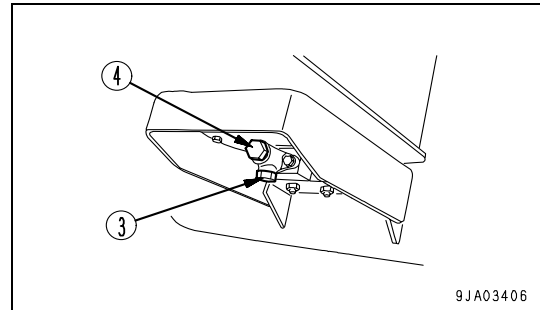
- The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

- Container to catch drained oil: Min 190 liters (50.2 US gal) capacity
- Refill capacity: 190 liters (50.2 US gal)

1. Lower the bucket horizontally to the ground and apply the parking brake, then stop the engine.
2. Remove bolts (1), then remove cover (2).
3. Remove the cap of oil filler (F).



4. Set a container to catch the oil under drain plug (3).
5. Remove drain plug (3).
6. Open drain valve (4) gradually and drain the oil.
7. After draining the oil, close drain valve (4), then tighten drain plug (3).



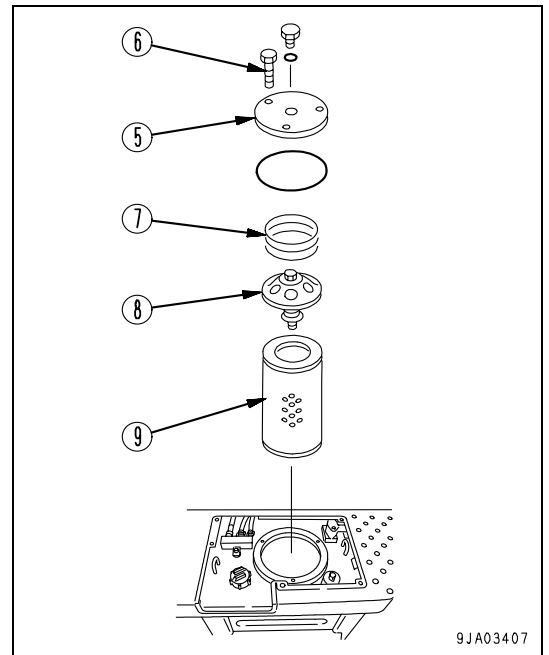
Tightening torque

Drain plug (3):

Tightening torque: $68.6 \pm 9.8 \text{ N}^2\text{m}$ ($7.0 \pm 1.0 \text{ kgf}^2\text{m}$, $50.6 \pm 7.2 \text{ lbft}$)

Drain valve (4): $63.7 \pm 14.7 \text{ N}^2\text{m}$ ($6.5 \pm 1.5 \text{ kgf}^2\text{m}$, $47.0 \pm 10.8 \text{ lbft}$)

8. Remove mounting bolts (6) of filter cover (5) at the top of the tank, then remove the cover.
When the cover is removed, the force of spring (7) may make the cover fly off, so keep the cover pushed down when removing the bolts.
9. Remove spring (7) and bypass valve (8), then remove element (9).
10. Check that there is no foreign material inside the tank, then clean it.
11. Install new element (9), then set bypass valve (8), spring (7), and cover (5) to the tank.
If the O-ring of the cover is damaged or deteriorated, replace it.
12. When installing the cover bolts, push down the cover and tighten the bolts evenly.
13. Add engine oil through oil filler port (F) to the specified level, then install cap (F).
14. Check that the hydraulic oil is at the standard level. For details, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (4-39)".

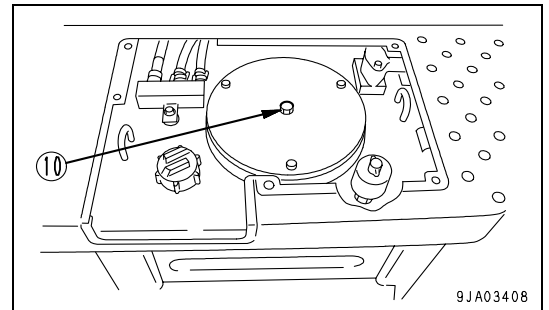


15. Run the engine at low idling, and extend and retract the steering, bucket, and lift arm cylinders 4 to 5 times. Be careful not to operate the cylinder to the end of its stroke (stop approx. 100 mm (3.9 in) before the end of stroke).

NOTICE

If the engine is run immediately at high speed or the cylinder is operated to the end of its stroke, the air inside the cylinder will cause damage to the piston packing.

16. Next, operate the steering, bucket, and lift arm cylinders to the end of their stroke 3 to 4 times, then stop the engine and loosen bleed plug (10) to bleed the air from the hydraulic tank. After bleeding the air, tighten plug (10) again.
Run the engine at low idling when bleeding the air.
17. Check that the hydraulic oil is at the standard level. For details, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (4-39)".



18. Next, increase the engine speed and repeat the procedure in Step 16 to bleed the air. Continue this operation until no more air comes out from plug (10).
19. After completing the air bleed operation, tighten plug (10).
Tightening torque: $11.3 \pm 1.5 \text{ N}^2\text{m}$ ($1.15 \pm 0.15 \text{ kgf}^2\text{m}$, $8.3 \pm 1.1 \text{ lbft}$)
20. Check that the hydraulic oil is at the standard level. For details, see "CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL (4-39)".
21. Check that there is no leakage of oil from the filter cover mount.

REPLACE HYDRAULIC TANK BREATHER ELEMENT

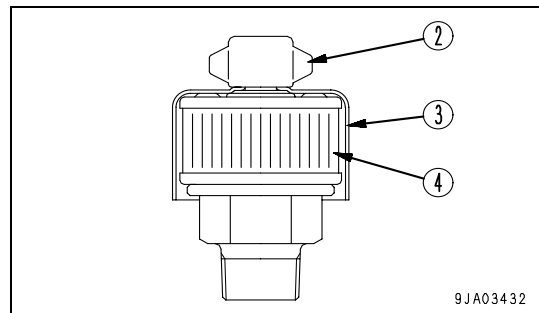
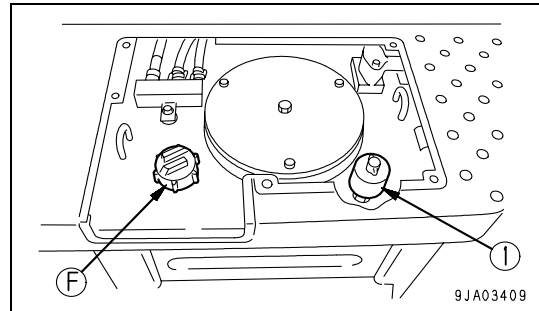
⚠ WARNING

- The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

1. Before removing the breather, wipe off all the dirt from around the breather.
2. Remove the cap of oil filler (F).
3. Remove nut (2) of breather (1), then remove cover (3).
4. Replace filter element (4) with a new part, then install cover (3) and nut (2).
5. Tighten the cap of oil filler (F).

REMARK

It is possible to replace the element with the breather installed in the tank. However, if the breather is removed, do not wrap the taper thread of the breather with seal tape when assembling again, and be careful not to tighten too much.



CHANGE AXLE OIL

⚠ WARNING

- When changing the oil, apply the parking brake and secure the front and rear frames with the safety bar.
- After the engine is stopped, the parts and oil are at high temperature, and may cause burns. Wait for the temperature to go down before starting the operation.
- When the plug is removed, oil may spurt out, so turn it slowly to release the internal pressure, then remove it carefully.

- Container to catch drained oil: Min 105 liters (27.74 US gal) capacity
- Refill capacity (front and rear, each): 52 liters (13.74 US gal)

1. Set a container to catch the oil under drain plug (P).
2. Remove front and rear oil filler plugs (1), then remove drain plug (P) to drain the oil.

REMARK

Remove the mud and dirt from around plug (1), then remove the plug.

3. After draining the oil, clean drain plug (P) and install it again.
4. Add axle oil through plug hole (1) at the specified level.

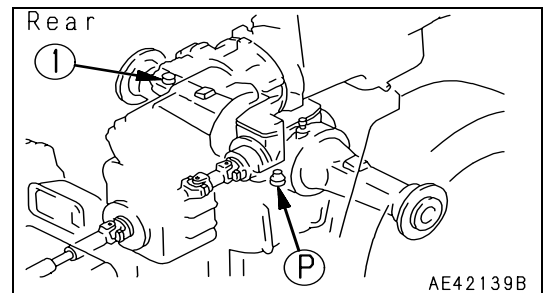
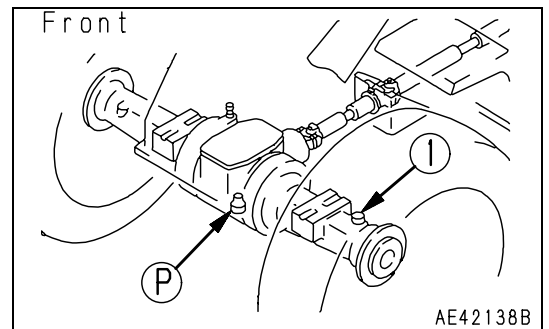
REMARK

For axles with ASD (Anti-Slip Differential), the brand of lubricating oil is different, so always use the specified lubricating oil.

5. After adding oil, check at level plug (1) that the oil is at the specified level. For details, see "CHECK AXLE OIL LEVEL, ADD OIL (4-25)".

REMARK

For operations where the brake is used frequently, change the axle oil at shorter intervals.



REPLACE ELEMENT IN AIR CONDITIONER RECIRCULATION AIR FILTER, FRESH AIR FILTER

Remove both the recirculation air filter and fresh air filter in the same way as when cleaning, and replace them with new parts.

For details of cleaning the recirculation air filter, see "CLEAN ELEMENT IN AIR CONDITIONER RECIRCULATION FILTER (4-45)".

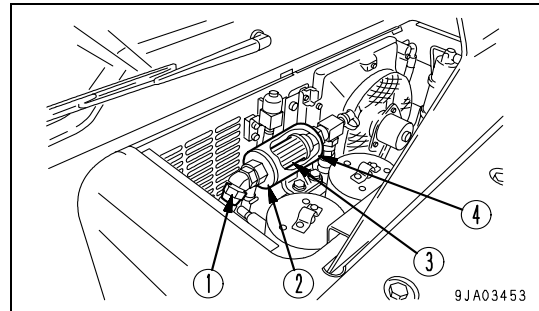
For details of cleaning the fresh air filter, see "CLEAN ELEMENT IN AIR CONDITIONER FRESH AIR FILTER (4-40)".

CLEAN PPC CIRCUIT STRAINER

⚠ WARNING

- After the engine is stopped, the parts and oil are at high temperature, and may cause burns. Wait for the temperature to go down before starting the operation.
- When the rubber hose is removed, oil may spurt out, so turn it slowly to release the internal pressure, then remove it carefully.

1. When rubber hose (1) and flange (2) are removed, oil will spill out, so set a container (capacity: approx. 300 cc) in position to catch the oil.
2. Remove rubber hose (1) and flange (2).
3. Remove strainer (3) and wash it in clean diesel oil.
4. Install strainer (3) in strainer case (4) from the concave side, then install with flange (2).



REMARK

Assemble with the protruding side (O-ring side) of the strainer at the front

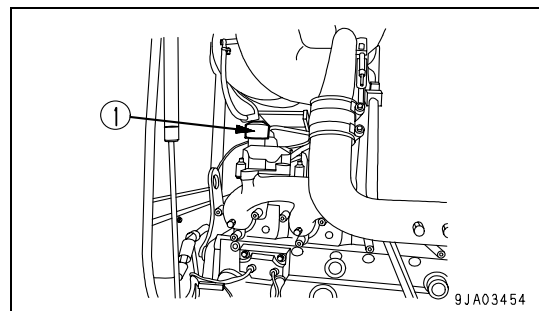
5. Install rubber hose (1).

CLEAN ENGINE BREATHER ELEMENT

⚠ WARNING

- The parts and oil are at high temperature after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before cleaning the engine breather.
- When using compressed air, there is a hazard that dirt may be blown up and cause serious injury.
- Always use safety glasses, dust mask, or other protective equipment.

1. Wipe away dust around the breather.
2. Loosen the clamp and remove the hose. Remove breather (1).
3. Clean the breather body with light oil or cleaning oil.
4. Replace O-ring with new one. Coat a new O-ring with engine oil, set it, then install breather (1).
5. Check the breather hose and pipe. If caked oil (sludge) adhere to insides, replace the hose and pipe with new parts.



CHEK ALTERNATOR, STARTING MOTOR

The brush may be worn or may be no grease on the bearing, so contact your Komatsu distributor for inspection or repair.

If the engine is started frequently, carry out inspection every 1000 hours.

CHECK ENGINE VALVE CLEARANCE, ADJUST

As special tool is required for removing and adjusting the parts, request your Komatsu distributor for service.

CLEAN AND CHECK TURBOCHARGER

If there is carbon or oil sludge stuck to the blower impeller, it will lower the performance of the turbocharger or cause it to break, so ask your Komatsu distributor to carry out the cleaning.

CHECK INJECTOR

Check the exhaust gas color visually. If there is any abnormality in the exhaust gas color, please contact your Komatsu distributor for inspection or replacement. For details of the action to take if there is an abnormality, see "ENGINE (3-137)".

CHECK ACCUMULATOR GAS PRESSURE

When carrying out the EVERY 2000 HOURS SERVICE or EVERY YEAR SERVICE or when making periodic replacement of the critical safety parts, please ask your Komatsu distributor to check the accumulator gas pressure.

CHECK VIBRATION DAMPER

Check that there are no cracks or peeling in the outside surface of the rubber.

If any cracks or peeling are found, contact your Komatsu distributor to have the parts replaced.

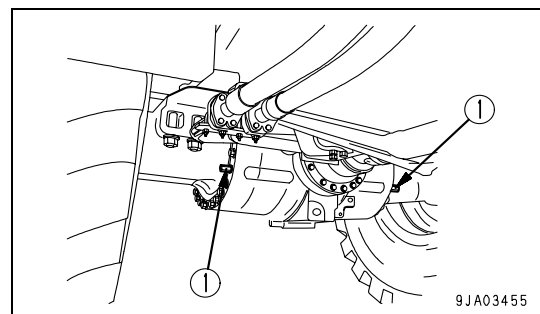
CHECK BRAKE DISC WEAR

 **WARNING**

- When checking the brake disc wear, apply the parking brake and secure the front and rear frames with the safety bar.
- Make sure that the brake oil temperature is less than 60°C (140°F) before checking the brake wear.
- If the disc is near the wear limit, carry out inspection at shorter intervals, regardless of the specified inspection interval.

When checking the brake disc for wear, there are 4 places (front axle and rear axle, left and right), so use the same procedure to check all 4 places.

1. Remove cap nut (1).

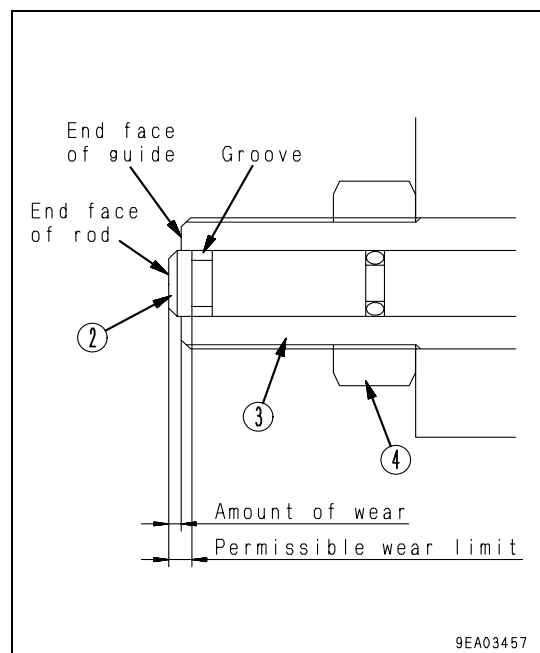


2. Depress the brake pedal, keep it depressed, and push in the rod (2) of the gauge until contacts the piston.
3. The wear is the amount that the end face of rod (2) is protruding from the end face of guide (3). Measure the amount of protrusion.

The point where the rod groove is level with the end face of the guide is the permissible limit for the disc wear.

If the wear has reached this point, please ask your Komatsu distributor for inspection and replacement parts.

- If the disc is near the wear limit, carry out inspection at shorter intervals, regardless of the specified inspection interval.
4. Install cap nut (1).
Tightening torque: 29.4 to 39.2 N²m (3.0 to 4.0 kgf²m, 21.7 to 28.9 lbft)

**REMARK**

- On new machines, the position of the guide is adjusted so that the end face of rod (2) comes to the end face of guide (3). For this reason, do not loosen locknut (4) except when replacing the disc.
- Carry out the operation with two workers: one worker depresses the brake pedal and the other worker pushes in rod (2).

EVERY 4000 HOURS SERVICE

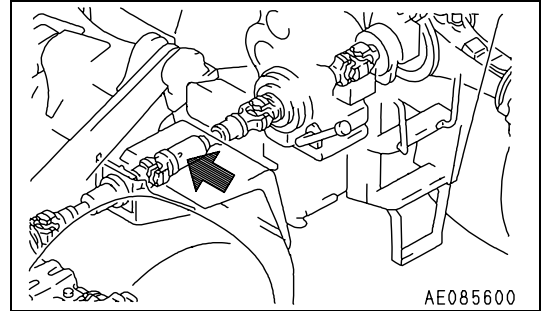
Maintenance for every 50, 100, 250, 500, 1000 and 2000 hours service should be carried out at the same time.

LUBRICATING

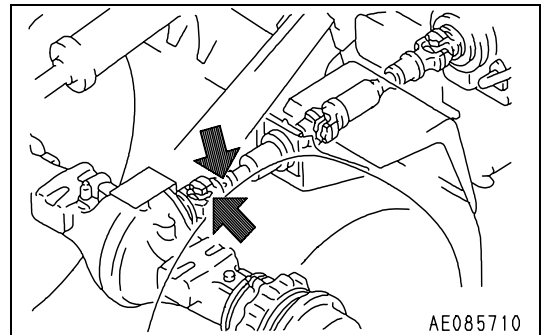
Carry out the greasing once every two years, regardless of whether the 4000 hour interval has passed.

- 1. Using a grease pump, pump in grease through the grease fittings marked by the arrows.
- 2. After greasing, wipe off any old grease that was pushed out.

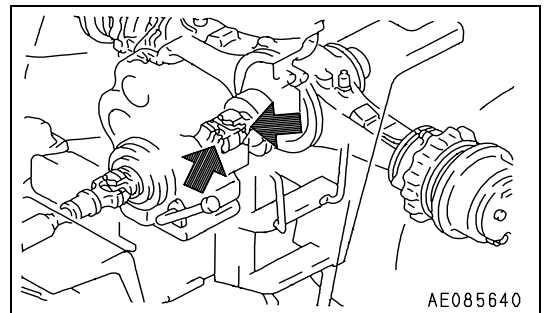
(1)Center drive shaft spline (1 point)



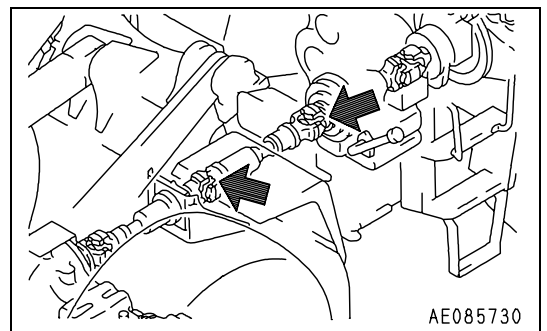
(2)Front drive shaft (2 points)



(3)Rear drive shaft (2 points)



(4)Center drive shaft (2 points)



CHECK WATER PUMP

Check that there is no play in the pulley or any grease leakage, water leakage, or clogging of the drain hole. If any abnormality is found, contact your Komatsu distributor for disassembly and repair or replacement.

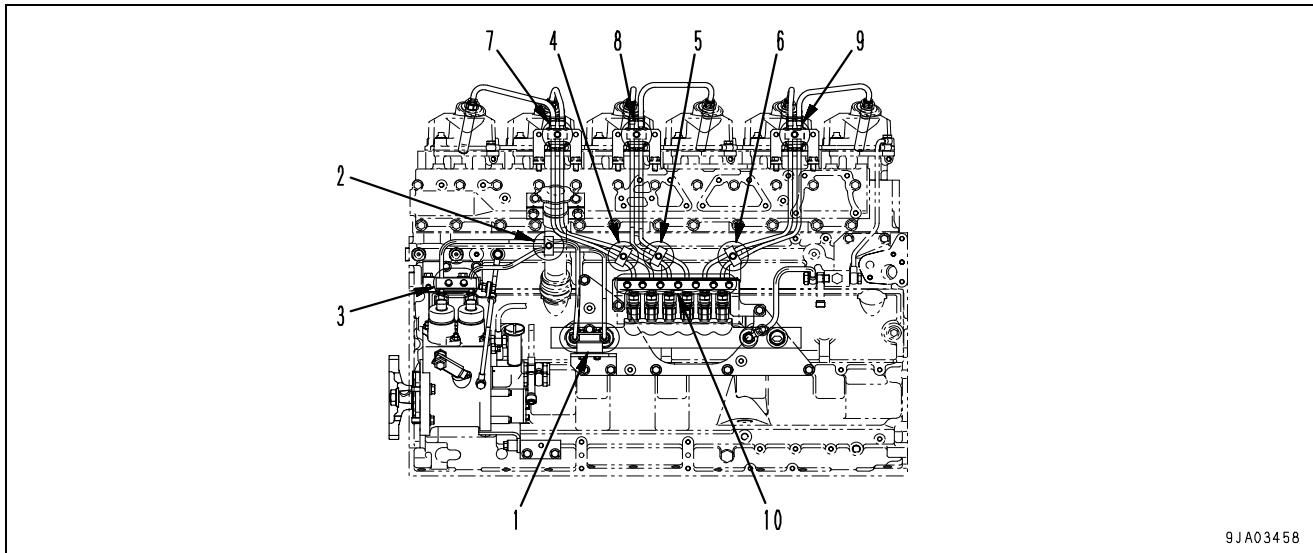
CHECK AIR CONDITIONER COMPRESSOR, ADJUST

As special tool is required for checking and adjusting the parts, request Komatsu distributor for service.

CHECK INJECTOR NOZZLE TIP

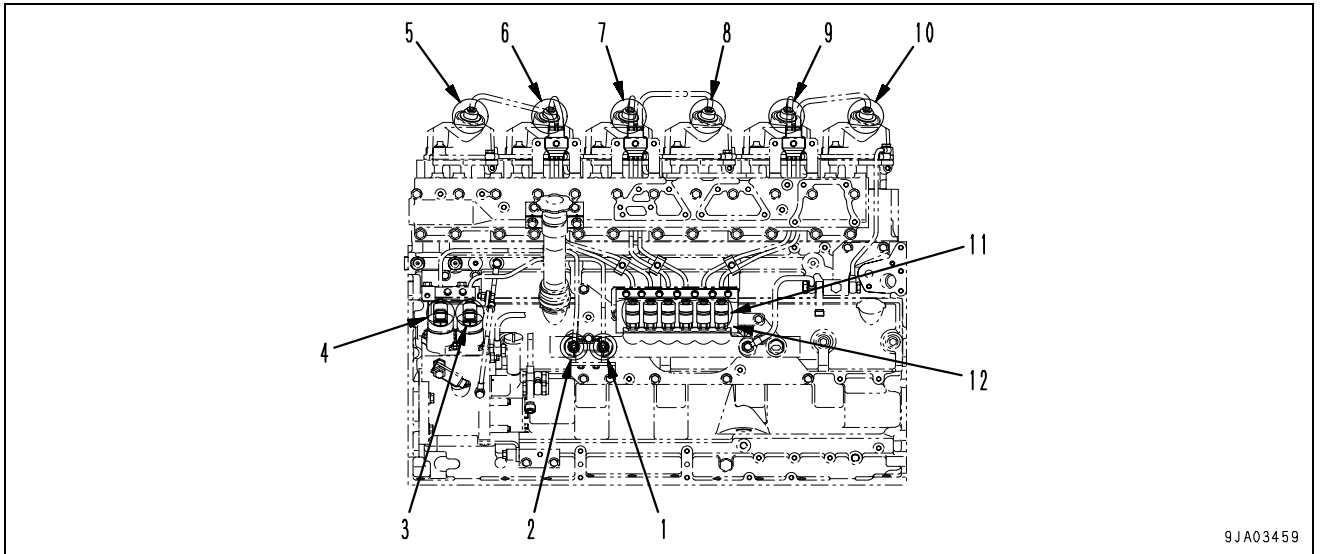
Ask your Komatsu distributor to carry out this work.

CHECKING FOR LOOSENESS OF HIGH-PRESSURE CLAMP, HARDENING OF RUBBER



Check visually and touch with your fingers to check that there are no loose bolts or hardening of rubber parts at clamps (1) to (10). If there is any looseness or hardened rubber, contact your Komatsu distributor for replacement.

CHECKING FOR MISSING FUEL SPRAY PREVENTION CAP, HARDENING OF RUBBER



9JA03459

Check for any missing fuel spray prevention caps (1) - (11) or fuel spray prevention cover (12), and check also for any hardened rubber portions. If there are any missing caps or cover or the rubber is hardened, please contact your Komatsu distributor for repairs.

EVERY 8000 HOURS SERVICE

Maintenance for every 50, 250, 500, 1000, 2000 and 4000 hours service should be carried out at the same time.

REPLACE HIGH-PRESSURE PIPING CLAMP

Ask your Komatsu distributor to carry out this work.

REPLACE FUEL SPRAY PREVENTION CAP

Ask your Komatsu distributor to carry out this work.

CHECK INJECTOR NOZZLE TIP, REPLACE IF NECESSARY

How to judge nozzle tip replacement:

- If engine stall speed is out of service limit value.
- If exhaust gas colour changed beyond service limit value.
(See Shop Manual for Service Limit Values on the relevant models).

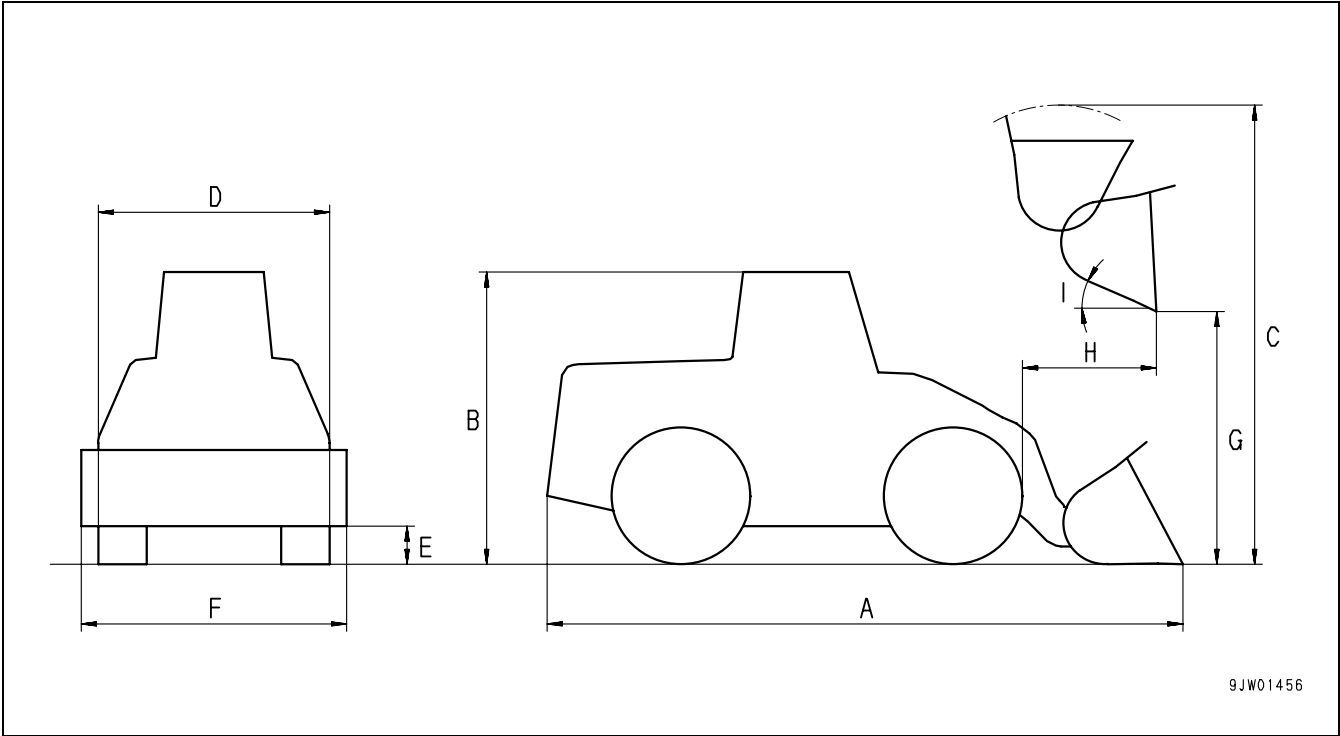
Ask your Komatsu distributor to carry out this work.

TECHNICAL DATA

TECHNICAL DATA

WA470-5H

Item		Unit	WA470-5H standard specification machine (when using POWER mode)	
Operating weight (including 1 operator: 80 kg) (with bolt on cutting edge)		kg	23.192	
Normal load		kg	6.720	
Bucket capacity		m ³	4,2	
Engine model		-	Komatsu SAA6D125E-3 diesel engine	
Flywheel horsepower		kW(HP)/rpm	195 (265)/2,000	
A	Overall length	mm	8.882	
B	Overall height	mm	3.460	
C	Max. dimension when shanking bucket	mm	5.983	
D	Overall width	mm	2.903	
E	Min. ground clearance	mm	460	
F	Bucket width	mm	3.000	
G	Dump height at 45°	Cutting edge [BOC tip]	mm	3.106
H	Reach at 45°	Cutting edge [BOC tip]	mm	1.349
I	Dump angle	degrees	45°	
	Min. turning radius	At bucket edge	mm	6.899
		At corner of tyres	mm	6.201
Travel speed	Forward with torque converter lockup	1st	km/h	6,3
		2nd	km/h	12,1
		3rd	km/h	22,8
		4th	km/h	39,7
	Reverse with torque converter lockup	1st	km/h	6,7
		2nd	km/h	12,8
		3rd	km/h	24,7
		4th	km/h	40,9
Hydraulic pressure	Lift circuit	bar	210	
	Tilt circuit			
	Third control circuit			



9JW01456

NOISE EMISSION LEVELS

Two plates indicating the machine noise level are attached.

In accordance with ISO 6396

the value for the sound pressure level is $L_{pA} = 72$ dB/A

In accordance with EC Directive 2000/14/EG

the value for the sound power level is $L_{WA} = 107$ dB/A

No alterations may be made to the machine which could have an influence on the noise emission levels.

VIBRATION LEVEL

When used for its intended purpose, levels of vibration for the earthworking machine transmitted from the operator's seat are lower or equal to the test vibrations for the relative machinery class in compliance with ISO 7096. The actual acceleration value of the arms is less than 2.5 m/s^2 . The actual acceleration value for the body is less than 0.5 m/s^2 . These values were determined using a representative machine and with the help of the measurement procedures that are defined in the directives ISO 2631/1 and ISO 5349.

LIMIT VALUES FOR SLOPES

Maximum slope angle for machine operation

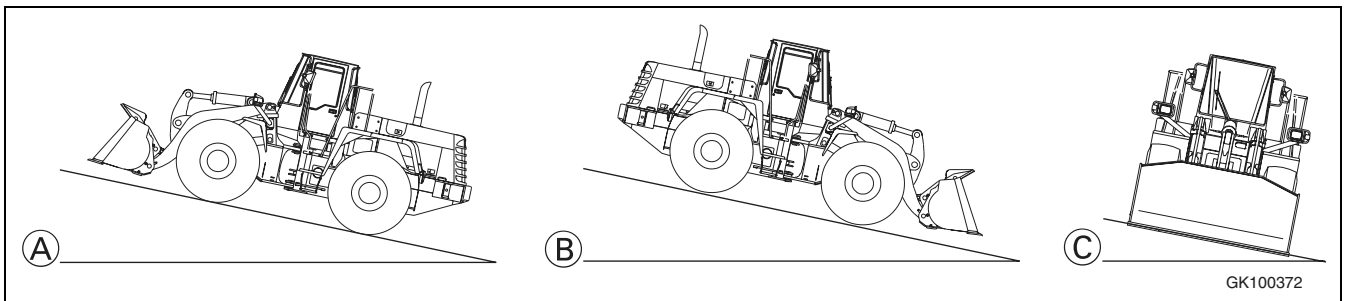
If operating the machine on a slope, its angle must not exceed 35° uphill, downhill or sideways. If you angle the machine at more than 35° during operation, the motor, transmission, hydraulic system or axles, will not be supplied with sufficient oil and can be damaged.

A uphill	26°
B downhill	35°
C sideways	16°

Tilt angle

The tipping angle is a calculated value. This states the angle at which the machine at rest can stand on a slope without tipping over. You must not work with the machine at these angles as the motor, transmission, hydraulic system or axles, will not be supplied with sufficient oil and can be damaged. The specified angle refers to the transport position. The angle changes if you raise or lower the work unit.

A uphill with operating load	63,3°
uphill without operating load	53,7°
B downhill with operating load	37,3°
downhill without operating load	56°
C lateral with operating load	42,5°
lateral without operating load	43,5°



ATTACHMENTS, OPTIONS

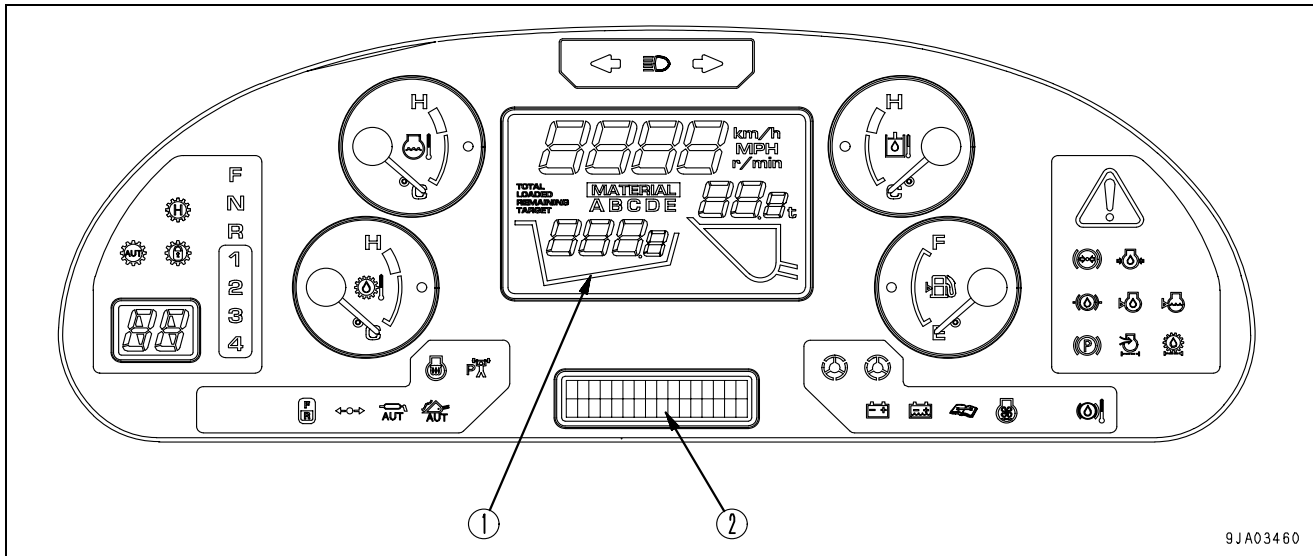
 **WARNING**

Please read and make sure that you understand the SAFETY section before reading this section.

HANDLING LOAD METER

GENERAL LOCATIONS

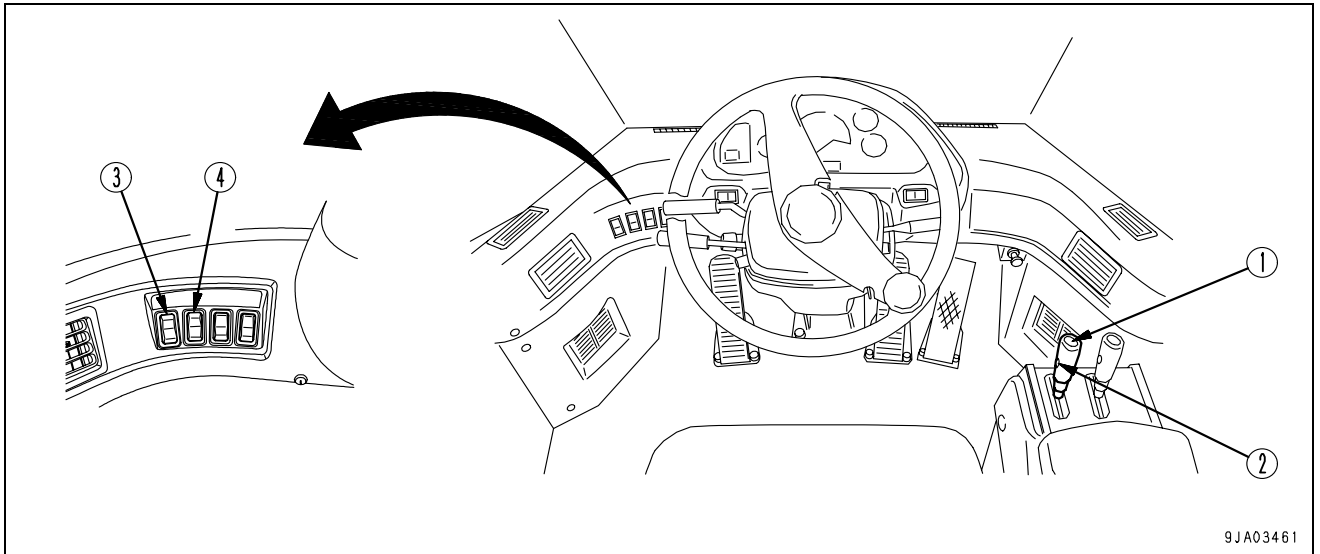
MACHINE MONITOR WITH LOAD METER



(1) Load meter display	(2) Character display
------------------------	-----------------------

The only difference from the machine monitor described in EXPLANATION OF COMPONENTS in the OPERATION section is that the load meter panel is installed in place of the speedometer and meter display pilot lamp. For details of items not given here, see "MACHINE MONITOR (3-6)" in the OPERATION section.

SWITCHES

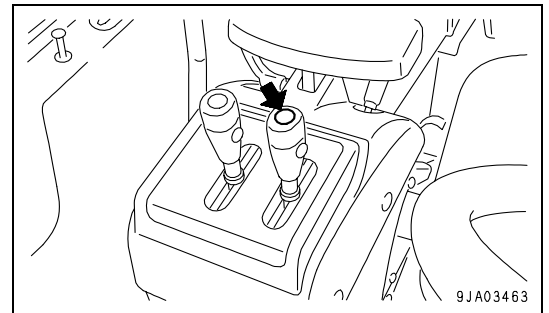


(1) Load meter cancel switch	(3) Monitor panel mode selector switch 1
(2) Load meter sub total switch	(4) Monitor panel mode selector switch 2

For details of switches (3) and (4), see “MONITOR PANEL MODE SELECTOR SWITCH 1 (3-42)” and “MONITOR PANEL MODE SELECTOR SWITCH 2 (3-43)”.

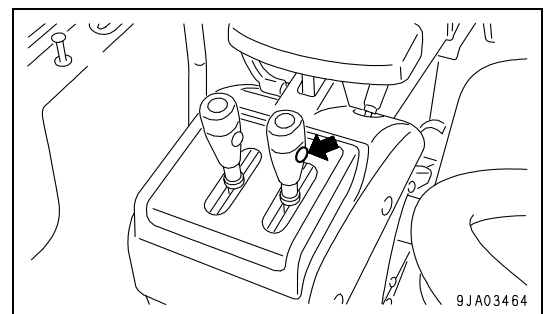
LOAD METER CANCEL SWITCH

When the measured data is not needed, press the switch at the top of the bucket control lever. The data that has just been calculated will be canceled and the display will return to the display before measuring.

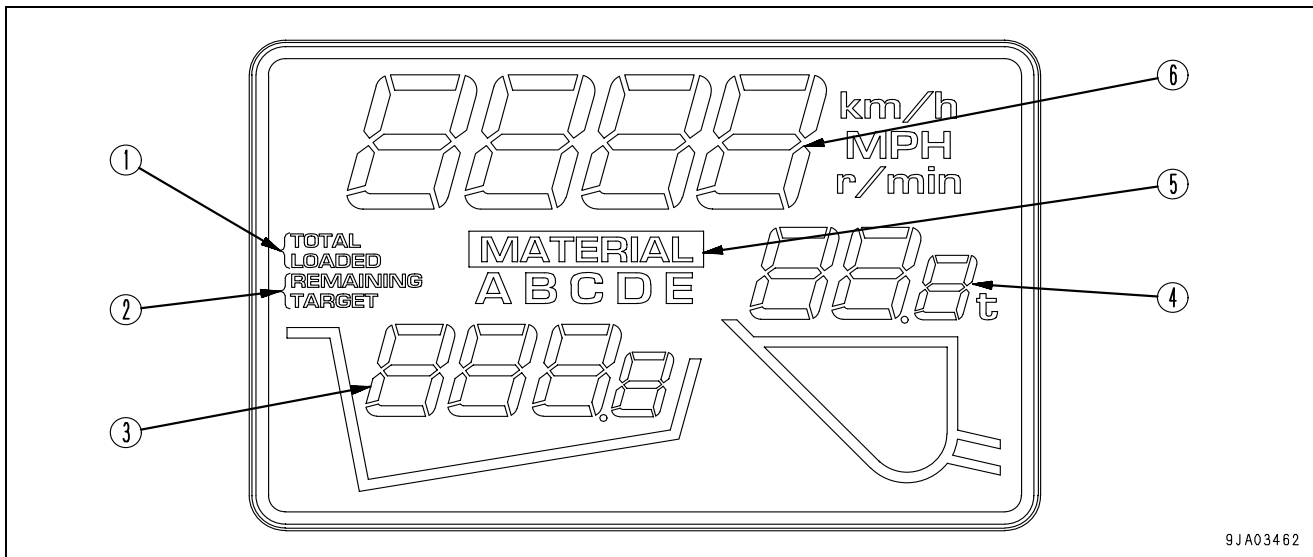


LOAD METER SUB TOTAL SWITCH

Press the switch at the side of the bucket control lever to set the TOTAL LOADED display (when in addition mode) or REMAINING TARGET display (when in remain mode) to 0.



LOAD METER FUNCTIONS



9JA03462

(1) Addition mode display	(4) Bucket load display
(2) Remain mode display	(5) Material type display
(3) TOTAL LOADED display (addition mode) or REMAINING TARGET display (remain mode)	(6) Speed display or engine speed display

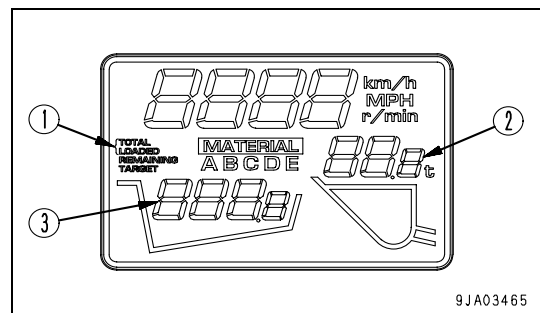
Operation of the various functions of the load meter is carried out by using monitor panel mode selector switch 1 or monitor panel mode selector switch 2 on the front switch panel and the load meter cancel switch and load meter sub total switch on the bucket control lever.

There are the following two types of measurement methods in the load meter mode.

- Addition mode (measuring total amount loaded)
This method is useful for measuring the production, such as the amount loaded into the dump truck, the amount loaded into the hopper, or the total work for half a day. The data can be displayed up to a maximum of 9999 tons for each type of work.
- Remain method (measuring amount remaining)
Use this method for work requiring a determined amount (prevention of overloading, distribution of material, etc.)

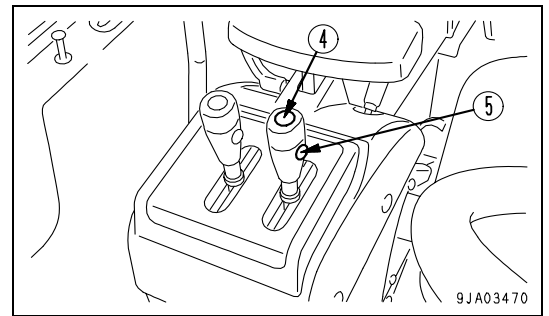
LOAD METER ADDITION MODE

- For details of the method of switching to the addition mode, see "SETTING ADDITION MODE (6-7)".
- "TOTAL LOADED" lights up on load meter display (1).
- The bucket load is displayed on load meter display (2), and the total load is displayed on display (3).



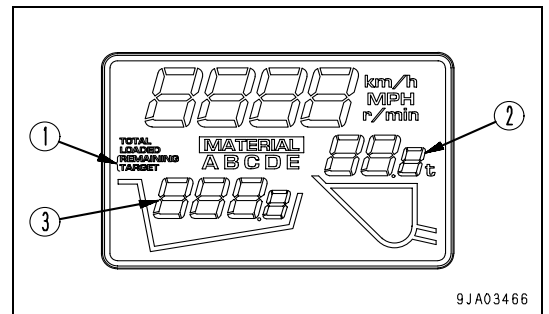
9JA03465

- If the measured data is not needed, press load meter cancel switch (4).
The data for the last calculation is canceled and display (3) returns to the display for the previous measurement.
- To return total load display (3) to 0, press load meter sub total switch (5).

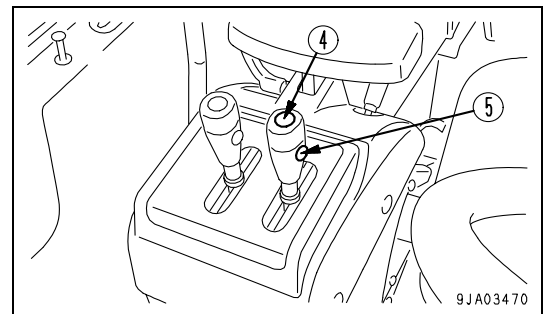


LOAD METER REMAIN MODE

- For details of the method of switching to the remain mode, see "SETTING REMAIN MODE (6-9)".
- "REMAINING TARGET" lights up on load meter display (1).
- The bucket load is displayed on load meter display (2), and the amount remaining to the target is displayed on display (3).

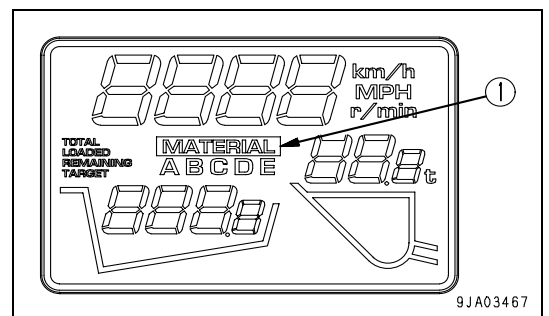


- If the measured data is not needed, press load meter cancel switch (4).
The data for the last calculation is canceled and display (3) returns to the display for the previous measurement.
- To return total load display (3) to 0, press load meter sub total switch (5).



SELECTION OF DISPLAY FOR TYPE OF LOAD

- For details of the method of selecting the type of load, see "SETTING ADDITION MODE (6-7)" and "SETTING REMAIN MODE (6-9)".
- It is possible to make categories for a maximum of five types of material for TOTAL LOADED or REMAINING TARGET.
If the settings for types A to E are changed for each type of material when operations are carried out, it is possible to store in memory the data for TOTAL LOADED or REMAINING TARGET for each type of material.
- One of the selected types of material A to E is displayed on load meter display (1).



METHOD OF CALIBRATION (ADJUSTING 0 POINT)

- For details of the method of carrying out calibration, see “CARRYING OUT CALIBRATION (ADJUSTING 0 POINT) WHEN EMPTY (6-15)” and “CARRYING OUT CALIBRATION (ADJUSTING 0 POINT) WHEN LOADED (6-17)”.

REMARK

Normally, it is sufficient to carry out calibration only when empty, but it is also possible to carry out calibration when loaded if necessary.

DELETING LOAD METER DISPLAY

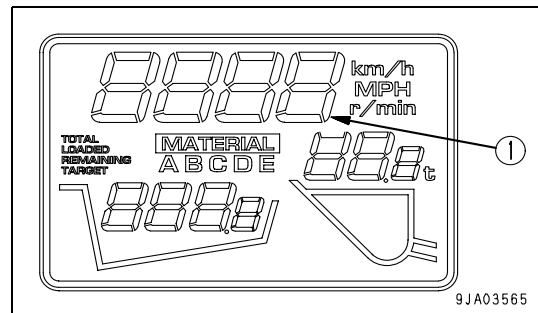
- It is possible to set so that there is no load meter display.
If there is no display, only the speed is displayed.
- \$ To switch the load meter between display and no display, see “STOPPING CALCULATION (6-14)”.

SPEED DISPLAY

- The travel speed of the machine is displayed on load meter display (1).

It is also possible to switch this display (1) so that it displays the engine speed.

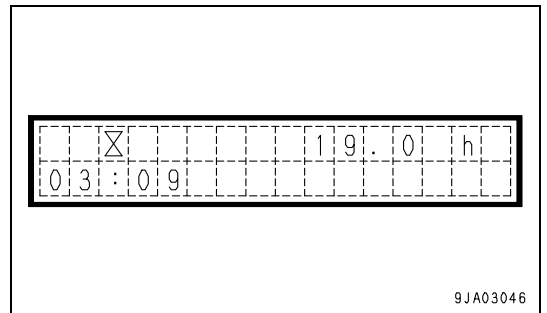
If you wish to switch the speed display to the engine speed display, please ask your Komatsu distributor to carry out the operation.



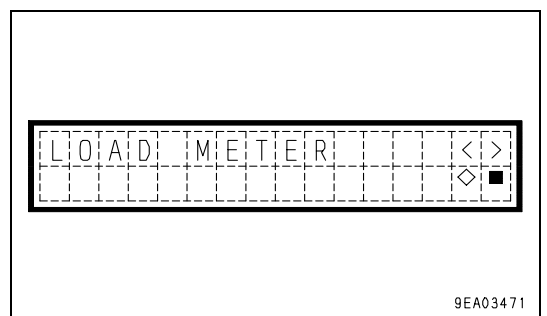
HANDLING LOAD METER DISPLAY

SETTING ADDITION MODE

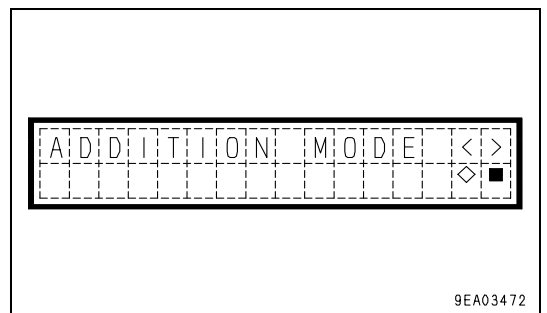
1. Check that the normal service meter and time are displayed on the character display.



2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".

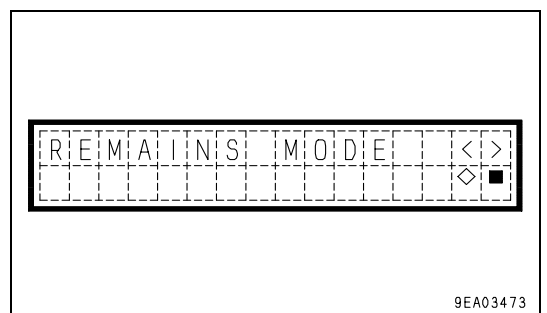


3. Press the (◇) of monitor panel selector switch 1 and display "ADDITION MODE".

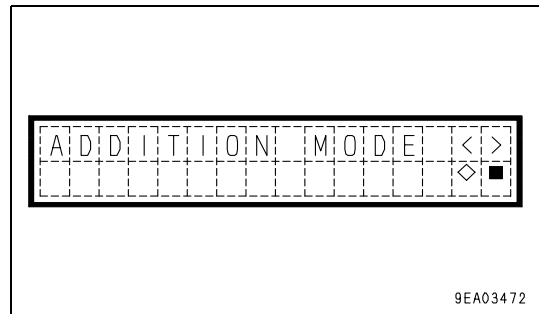


REMARK

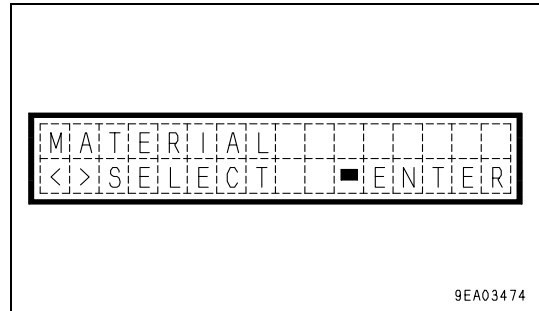
If the previous setting was the addition mode, "ADDITION MODE" is displayed; if the previous setting was the remain mode, "REMAINS MODE" is displayed.



- If the display is "REMAINS MODE", press the (>) or (<) of monitor panel mode selector switch 2 to display "ADDITION MODE".



- Press the (◇) of monitor panel selector switch 1 and display "MATERIAL <> SELECT".

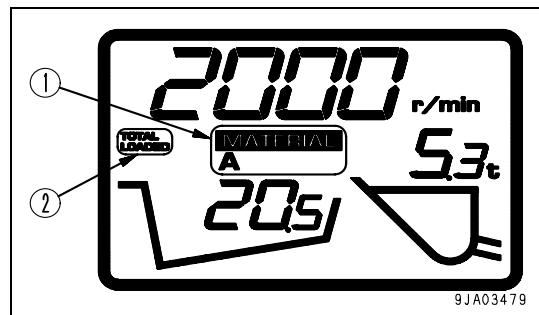


- Check the display for the selected material on load meter display (1).
The present selection display is A.

In the case of the addition mode, "TOTAL LOADED" is displayed on display (2).

- If A is to remain selected, press the (■) of monitor panel mode selector switch 1. A is then selected.

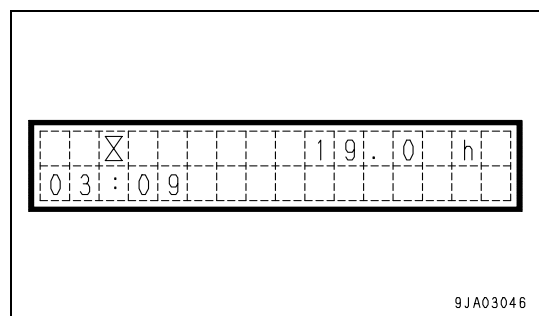
If A is to be changed to B to E, press the (>) or (<) of monitor panel mode selector switch 2 to select the type of material, then press the (■) of monitor panel mode selector switch 1.



- This completes the setting of the addition mode.

The character display returns to the normal service meter and time display.

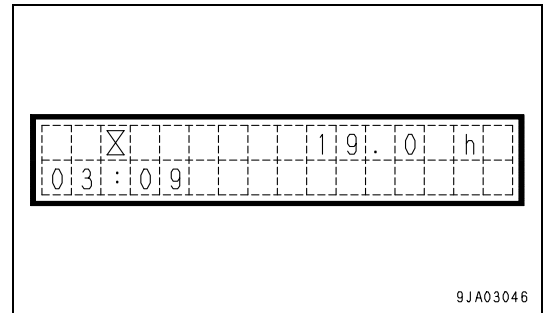
Once the setting has been made, even if the starting switch is turned OFF and operations are stopped, the setting is retained. When operations are started again, there is no need to carry out the setting again. All further loads will be added to the total load recorded before operations were stopped.



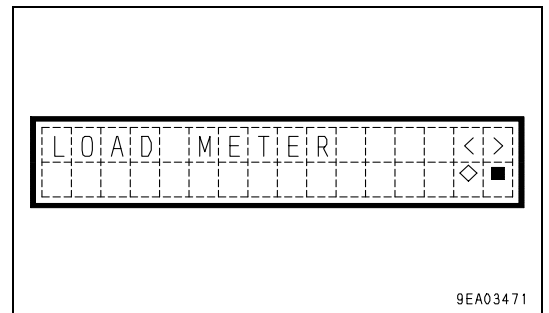
SETTING REMAIN MODE

When carrying out operations in the remain mode, set to the remain mode. For details of the remain mode functions, see "SUBTRACTION FUNCTION (6-20)".

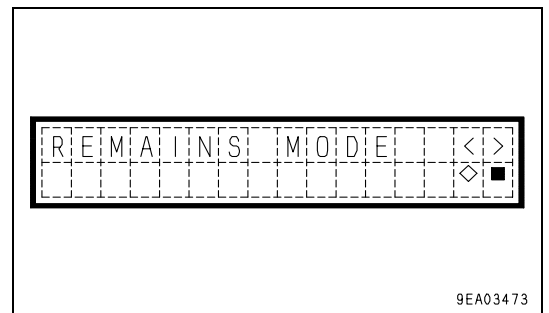
- 1. Check that the normal service meter and time are displayed on the character display.



- 2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".

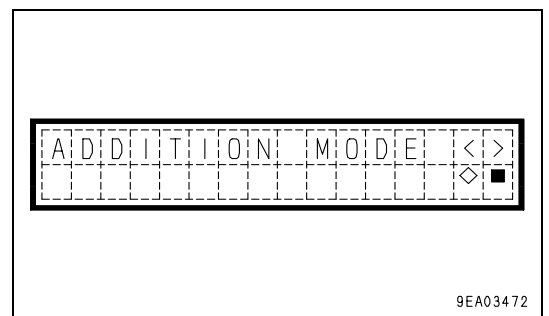


- 3. Press the (◇) of monitor panel selector switch 1 and display "REMAINS MODE".

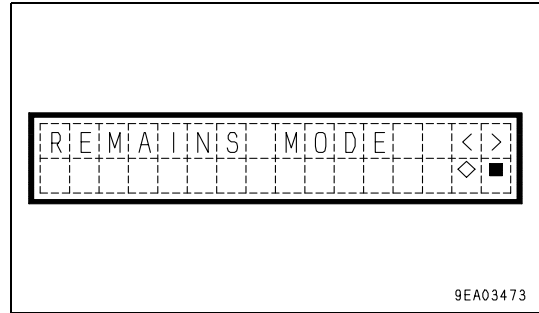


REMARK

If the previous setting was the addition mode, "ADDITION MODE" is displayed; if the previous setting was the remain mode, "REMAINS MODE" is displayed.

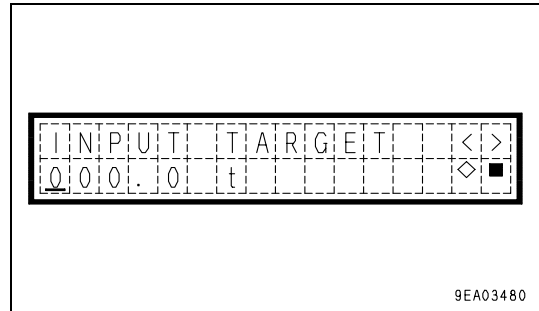


- If the display is "ADDITION MODE", press the (>) or (<) of monitor panel mode selector switch 2 to display "REMAIN MODE".

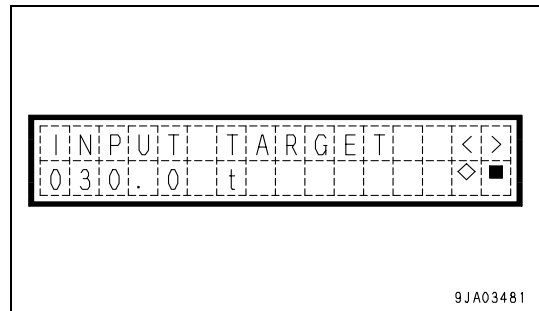


- Press the (◇) of monitor panel selector switch 1 and display "INPUT TARGET".
- Input the target load.
Before the target is input, "000.0 t" is displayed on the target line and the cursor is at the 100 ton position.

The following explanation explains the procedure when inputting 30 tons as the target.



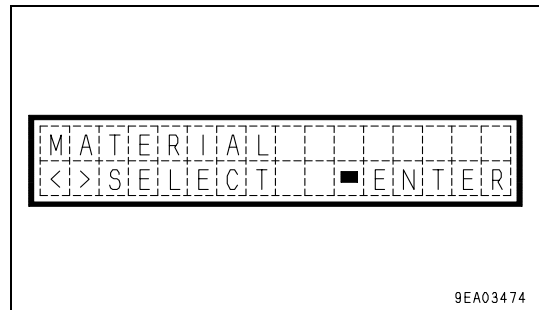
- "0" is marked by the cursor at the 100 ton position, so leave it at "0" and press the (◇) of monitor panel selector switch 1.
"0" is selected and the cursor moves to the 10 ton position.
- The "0" at the 10 ton position must be changed to "3", so press the (>) or (<) of monitor panel mode selector switch 2 to change to "3", then press the (◇) of monitor panel selector switch 1.
"3" is selected and the cursor moves to the 1 ton position.
- "0" is already displayed at both the 1 ton and 0.1 ton positions, so press the (◇) of monitor panel selector switch 1 twice.
"0.0" is selected and 30 tons is set as the target load.



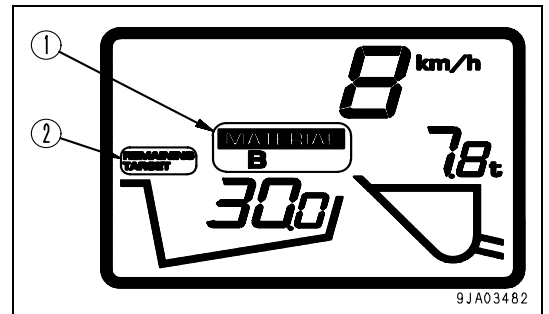
REMARK

If 0 tons is input as the target load, it is not accepted. The buzzer gives a long sound and the mode changes to give the addition mode display.

- Press the (◇) of monitor panel selector switch 1. If the monitor accepts the input amount, the buzzer will give short sounds and "MATERIAL < > SELECT" is displayed.

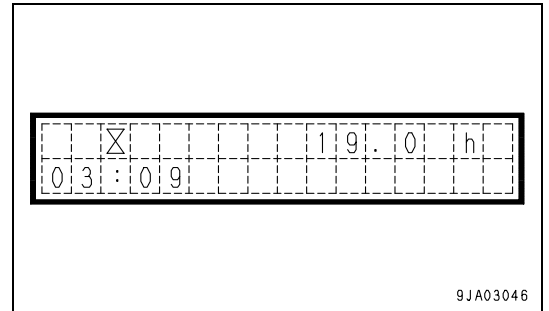


11. Check the display for the selected material on load meter display (1).
 The present selection display is B.
 In the remain mode, "REMAINING TARGET" is displayed on display (2).
12. If B is to remain selected, press the (■) of monitor panel mode selector switch 1. B is then selected.
 If B is to be changed to A, C, D or E, press the (■) of monitor panel mode selector switch 1.



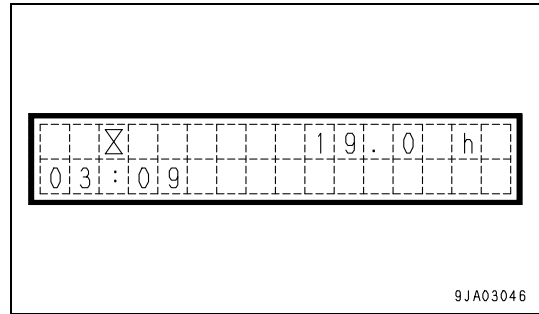
13. This completes the setting of the remain mode.
 The character display returns to the normal service meter and time display.

Once the setting has been made, even if the starting switch is turned OFF and operations are stopped, the setting is retained. When operations are started again, there is no need to carry out the setting again. All further loads will be subtracted from the total load recorded before operations were stopped.

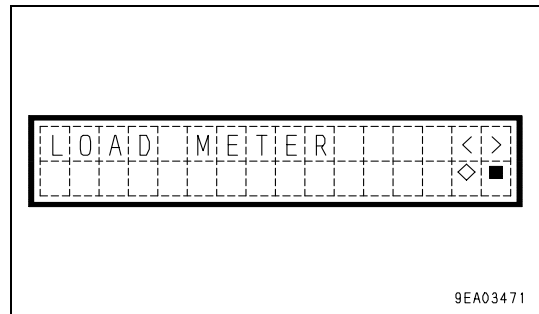


TOTAL LOAD DATA DISPLAY

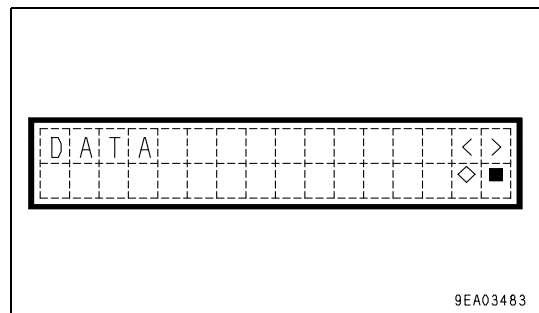
1. Check that the normal service meter and time are displayed on the character display.



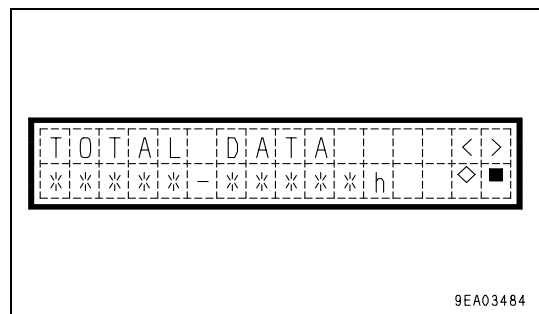
2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".



3. Press the (◇) of monitor panel selector switch 1, then press the (>) or (<) of monitor panel mode selector switch 2 to display "DATA".



4. Press the (◇) of monitor panel selector switch 1 to display "TOTAL DATA".
The time when the load on the bottom line was calculated is displayed as the hour meter standard.
5. Press the (>) or (<) of monitor panel mode selector switch 2 to select the data for each of A to E or the all lighted-up display.



The total load data for each of A to E and for all data is displayed on the load meter display.

Check the material selection display on load meter display (1). In the example on the right, all of A to E for all data selected light up.

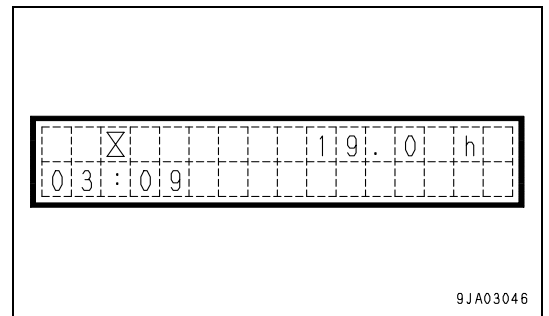
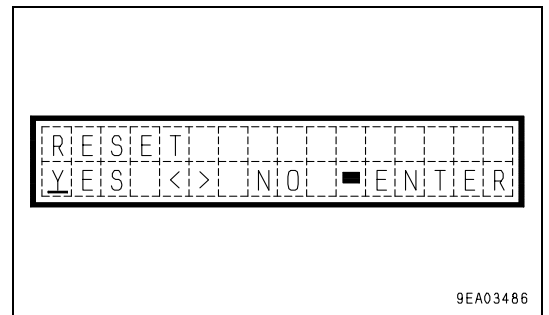
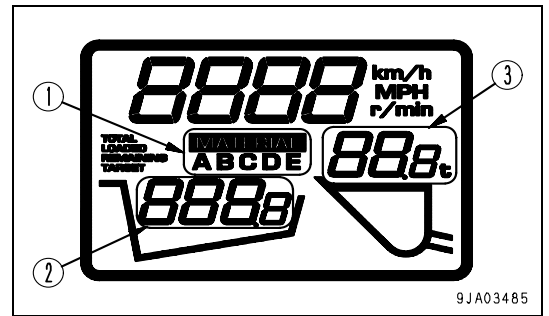
On display (2) the total load data for all data or individual total load data for A to E is displayed.

On display (3) the individual number of loads for A to E is displayed.

The total value can be cleared as follows.

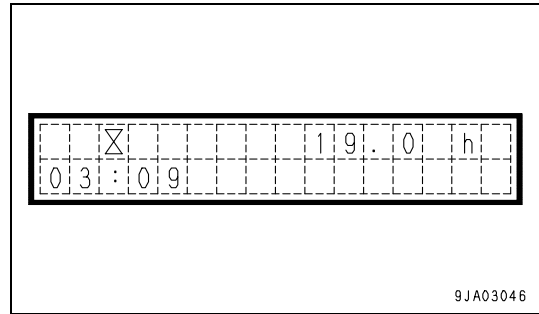
- 1) Press the (>) or (<) of monitor panel mode selector switch 2, and select the individual items to be cleared from A to E or select the all lighted-up display.
- 2) Press the (◇) of monitor panel selector switch 1 to display "RESET".
- 3) "YES < > NO" is displayed, and the cursor is at the NO position, so press the (<) of monitor panel mode selector switch 2 to move the cursor to the "Y" of YES.

- 4) Press the (■) of monitor panel mode selector switch 1. The selected individual item from A to E or all the data is cleared. If the monitor accepts the clear command, the buzzer gives short sounds and the display returns to the normal service meter and time display.

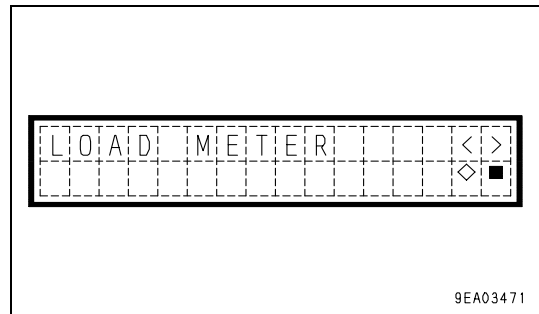


STOPPING CALCULATION

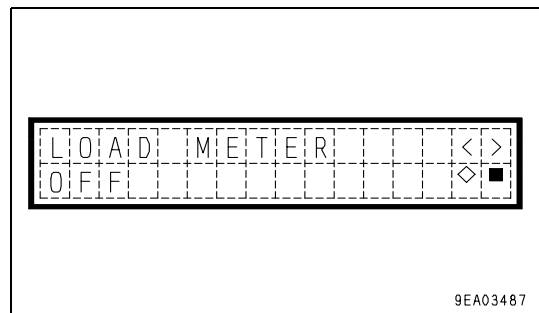
1. Check that the normal service meter and time are displayed on the character display.



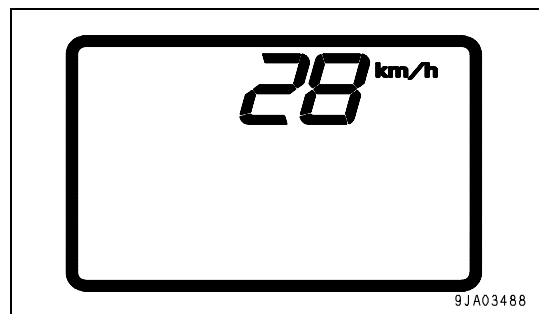
2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".



3. Press the (◇) of monitor panel selector switch 1, then press the (>) or (<) of monitor panel mode selector switch 2 and select "OFF" on the bottom line.

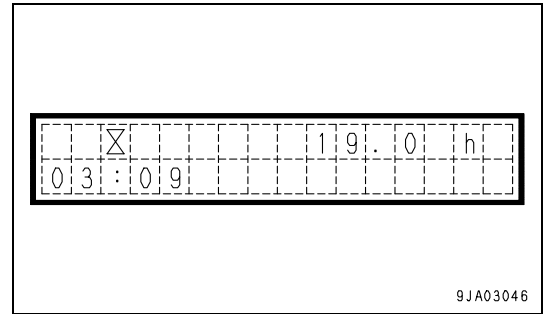


4. Press the (◇) of monitor panel selector switch 1. The load meter display goes out and the screen switches to the speed display. In addition, the character display returns to the normal service meter and time display.
5. When starting the calculation again, set to the addition mode or remain mode. For details, see "SETTING ADDITION MODE (6-7)" or "SETTING REMAIN MODE (6-9)".

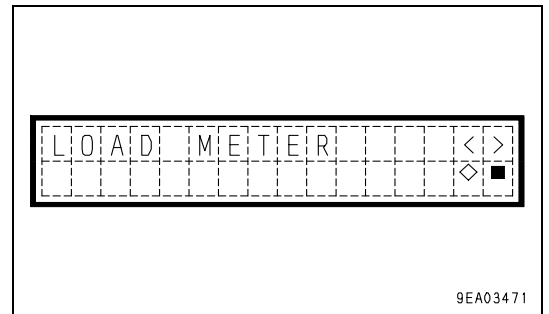


CARRYING OUT CALIBRATION (ADJUSTING 0 POINT) WHEN EMPTY

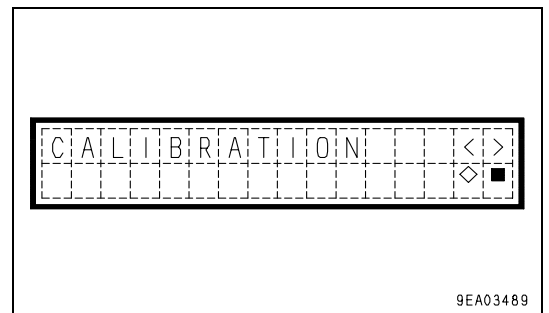
1. Check that the normal service meter and time are displayed on the character display.



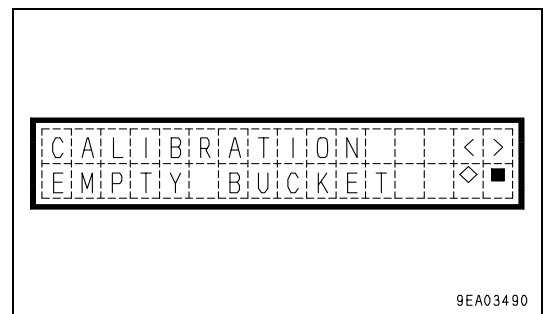
2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".



3. Press the (◇) of monitor panel selector switch 1, then press the (>) or (<) of monitor panel mode selector switch 2 and select "CALIBRATION".



4. Press the (◇) of monitor panel selector switch 1. "EMPTY BUCKET" is displayed on the bottom line.



5. Press the (◇) of monitor panel selector switch 1. The display changes to “STEP 1” on the top line, and “FULLY ROLL BACK” and “AT CARRY POSI” are displayed in turn for 3 seconds each on the bottom line.

6. Follow the instructions on the screen, tilt the empty bucket back fully, then lower the lift arm to set to the travel posture.

7. When the lift arm is lowered, the display changes to “STEP 2” and “RAISE TO TOP”.

This completes preparation for setting the calibration when empty.

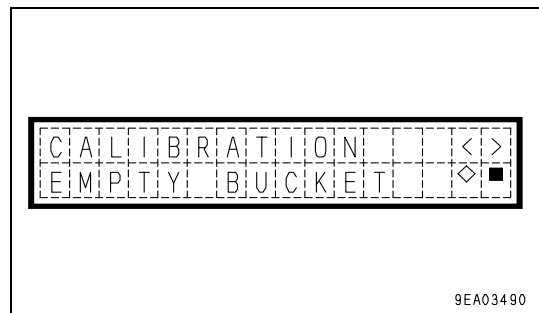
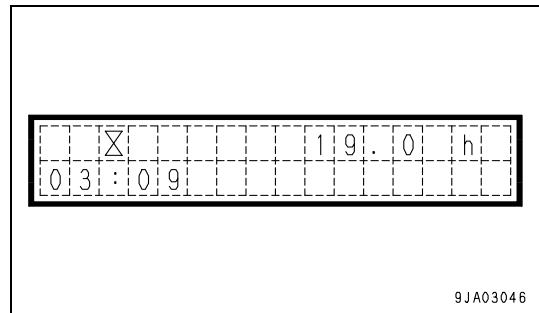
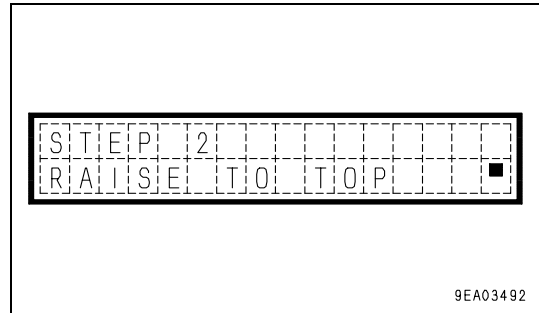
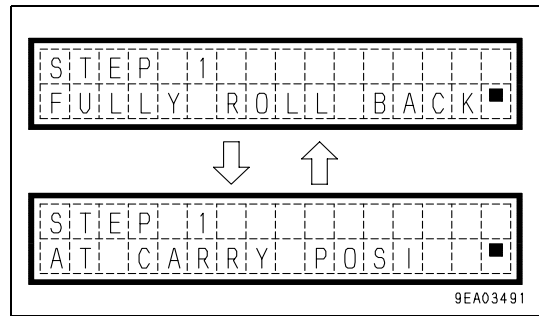
8. Follow the instructions on the screen and raise the lift arm fully.

When raising the lift arm, carry out the operation as close to actual operation as possible.

9. When the setting of the empty calibration is completed correctly, the buzzer gives short sounds, and the character display returns to the normal service meter and time display.

10. If the setting of the empty calibration is not completed correctly, the buzzer gives a long sound, and the display returns to “CALIBRATION” on the top line and “EMPTY BUCKET” on the bottom line.

11. Repeat the procedure again from Step 5.

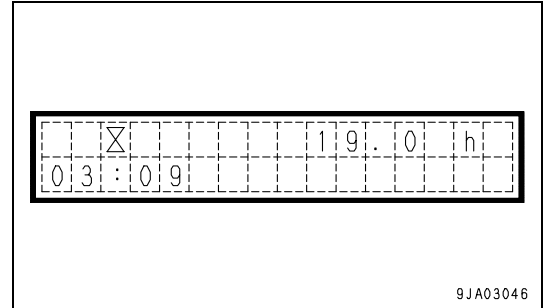


CARRYING OUT CALIBRATION (ADJUSTING 0 POINT) WHEN LOADED

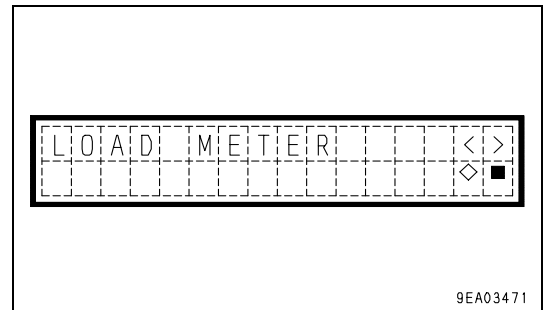
REMARK

Normally, there is no need to carry out calibration when loaded. It is enough to carry out calibration when empty, so carry out calibration when loaded only if greater accuracy is required.

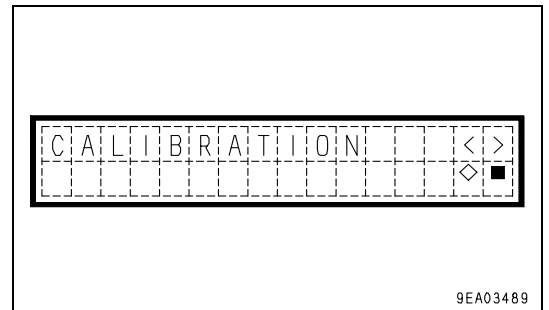
1. Check that the normal service meter and time are displayed on the character display.



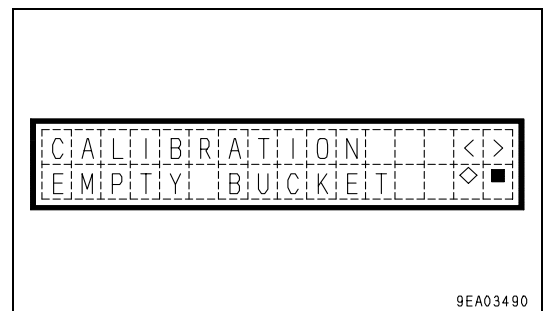
2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".



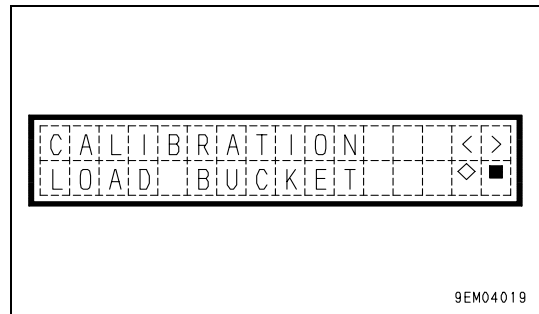
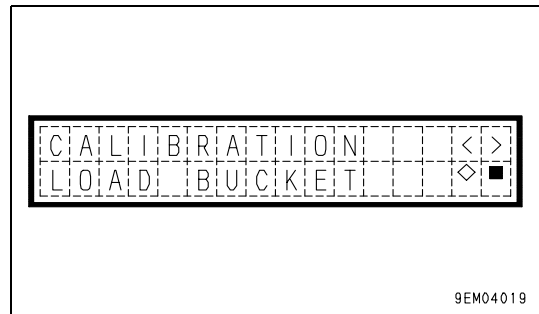
3. Press the (◇) of monitor panel selector switch 1, then press the (>) or (<) of monitor panel mode selector switch 2 and select "CALIBRATION".



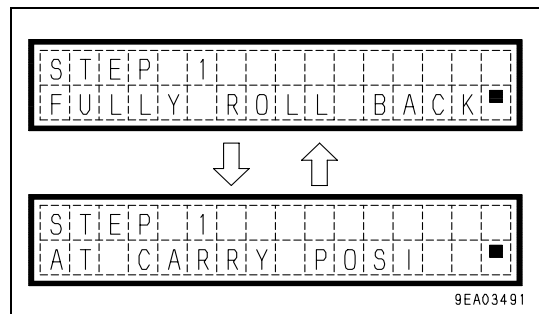
4. Press the (◇) of monitor panel selector switch 1. "EMPTY BUCKET" is displayed on the bottom line.



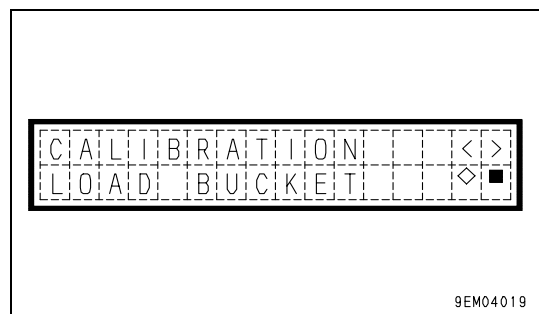
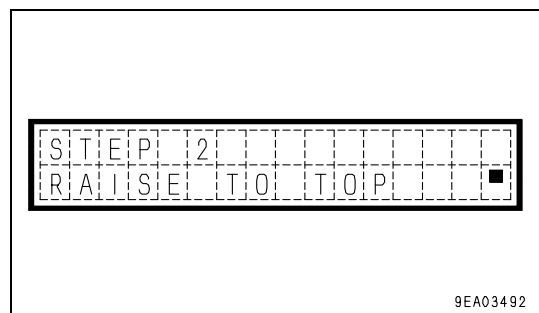
- Press the (>) of monitor panel mode selector switch 2. The bottom line changes to "LOAD BUCKET", so press the (◇) of monitor panel mode selector switch 1.



- Press the (◇) of monitor panel selector switch 1. The display changes to "STEP 1" on the top line, and "FULLY ROLL BACK" and "AT CARRY POSI" are displayed in turn for 3 seconds each on the bottom line.
- Load the bucket with a load of a known amount, then follow the instructions on the screen, tilt the bucket back fully, and lower the lift arm to set to the travel posture.

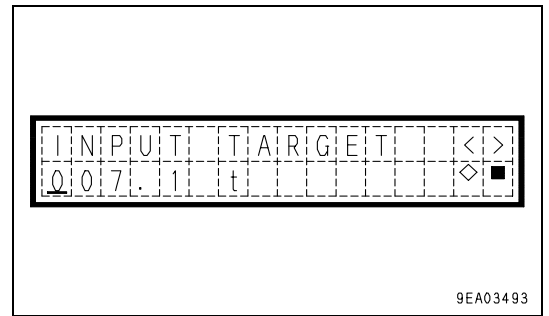


- When the lift arm is lowered, the display changes to "STEP 2" and "RAISE TO TOP". This completes preparation for setting the calibration when loaded.
- Follow the instructions on the screen and raise the lift arm fully. When raising the lift arm, carry out the operation as close to actual operation as possible.
- When the setting of the loaded calibration is completed correctly, the buzzer gives short sounds, and the screen changes to the screen for inputting the target load.
- If the setting of the loaded calibration is not completed correctly, the buzzer gives a long sound, and the display returns to "CALIBRATION" on the top line and "LOAD BUCKET" on the bottom line.
- Repeat the procedure again from Step 6.

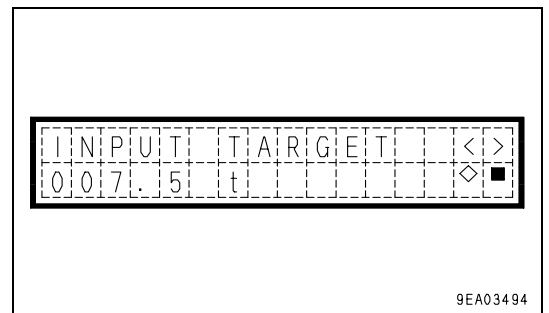


13. Input the load on the target load input screen.
 The data for the previously calculated load is displayed on the input screen.
 The cursor is at the 100 ton position.

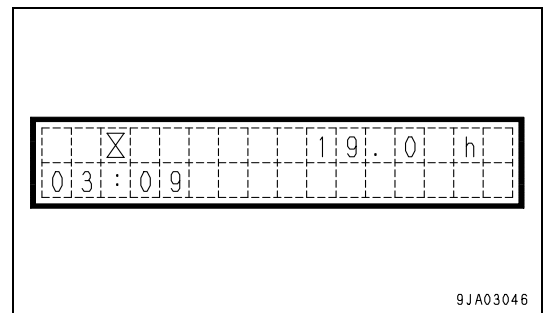
The following explanation explains the procedure when inputting 7.5 tons as the target when the previous load (the load set in Step 7) is 7.1 tons.



14. "0" is displayed at the 100 ton position, so leave it at "0" and press the (◇) of monitor panel selector switch 1 twice.
 "00" is selected and the cursor moves to the 1 ton position.
 15. "7" is already displayed at the 1 ton position, so press the (◇) of monitor panel mode selector switch 1.
 "7" is selected and the cursor moves to the 0.1 ton position.
 16. "1" is displayed at the 0.1 ton position, so press the (◇) of monitor panel mode selector switch 1.
 ".5" is selected and 7.5 tons is set as the target load.

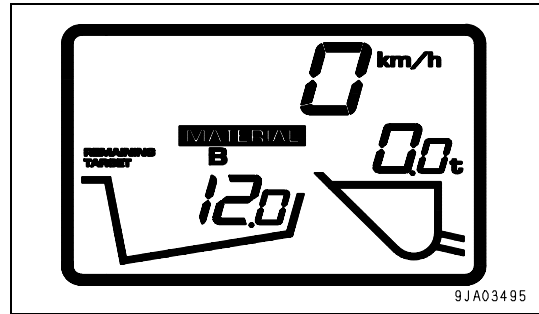


17. Press the (◇) of monitor panel mode selector switch 1. If the monitor accepts the setting, the buzzer gives short sounds, and the setting of the loaded calibration is completed. The screen returns to the normal service meter and time display.

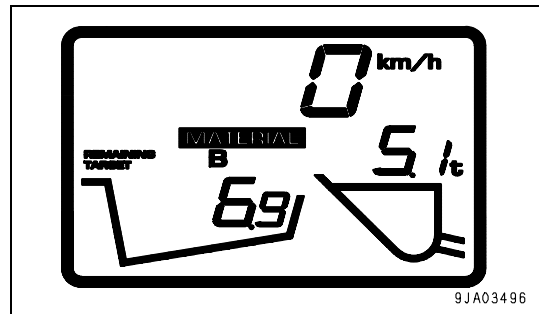


SUBTRACTION FUNCTION

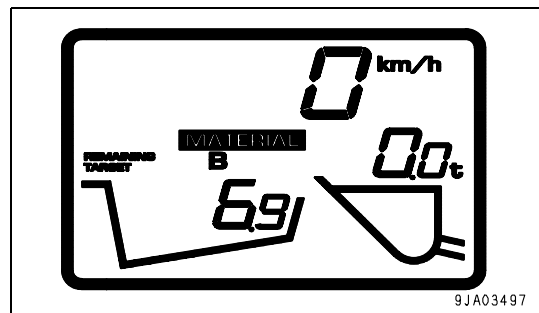
The following explanation assumes that after setting the remain mode, the target load is 12 tons as shown in the diagram on the right and that B is selected as the type of material.



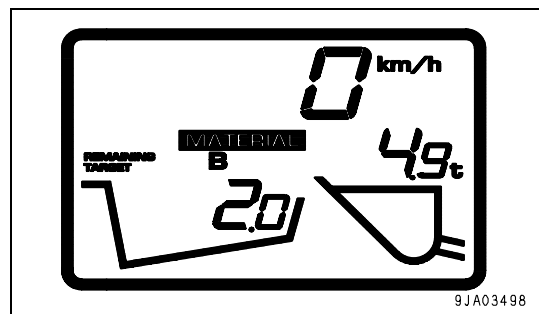
1. This is the first load.
The result of measuring the load in the bucket is 5.1 tons.
 $12.0 - 5.1 = 6.9$, so the next target load is displayed as 6.9 tons.



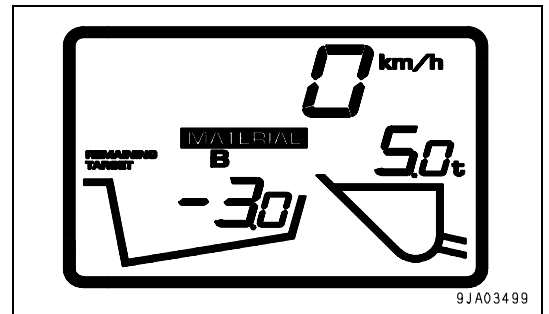
2. When 15 seconds pass after measuring, the bucket load is deleted and the load is displayed as 0.0 tons.



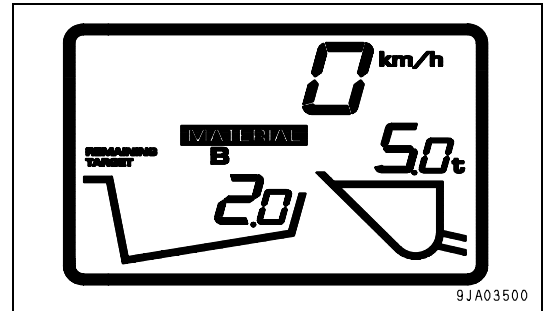
3. This is the second load.
The load in the bucket is 4.9 tons.
 $6.9 - 4.9 = 2.0$ tons, so the next target load is displayed as 2.0 tons.



4. This is the third load.
 The result of measuring the load in the bucket is 5.0 tons.
 This is 3.0 tons over the target amount, so -3.0 tons is displayed.

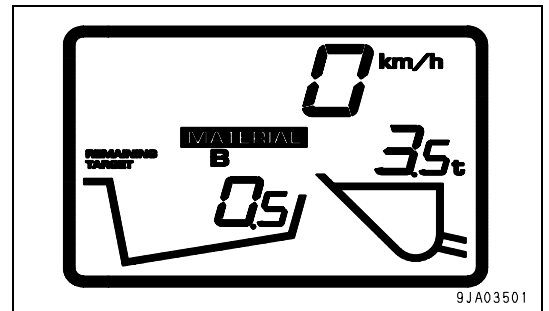


5. The target load is displayed as -3.0 tons, and after 3 seconds, the display changes to the display shown on the right. The target value of 2.0 tons is the target load after completing the loading of the second bucket.
 6. Load the target of 2.0 tons from the 5.0 tons loaded in the bucket.
 7. After loading, lower the lift arm and then raise it again in order to weigh the amount remaining in the bucket. The amount remaining in the bucket is weighed and displayed.

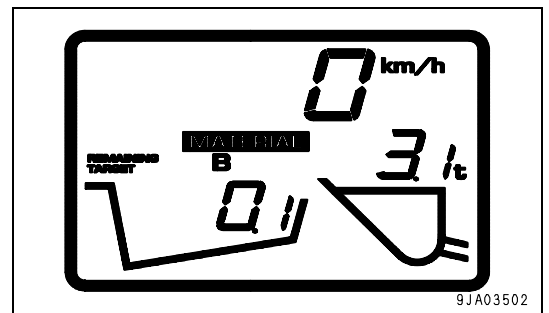


The amount remaining in the bucket is 3.5 tons.
 The target load is $2.0 - (5.0 - 3.5) = 0.5$ tons
 The next target load of 0.5 tons is displayed.

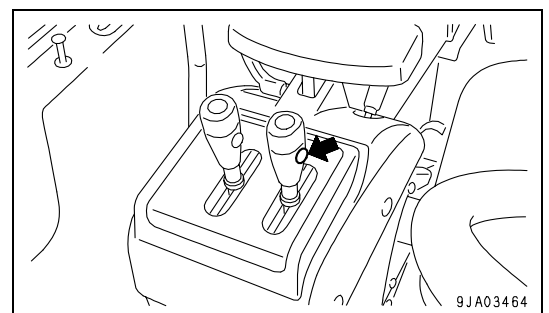
8. Load the target of 0.5 tons from the 3.5 tons loaded in the bucket.
 9. After loading, lower the lift arm and then raise it again in order to weigh the amount remaining in the bucket. The amount remaining in the bucket is weighed and displayed.



10. The amount remaining in the bucket is 3.1 tons.
 The target load is $0.5 - (3.5 - 3.1) = 0.1$ tons

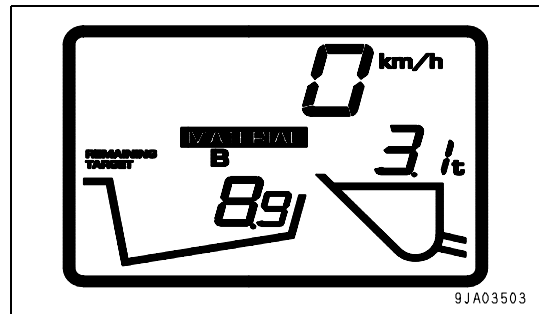


11. To start the next loading operation, press the load meter subtotal switch and the first loading operation is completed.



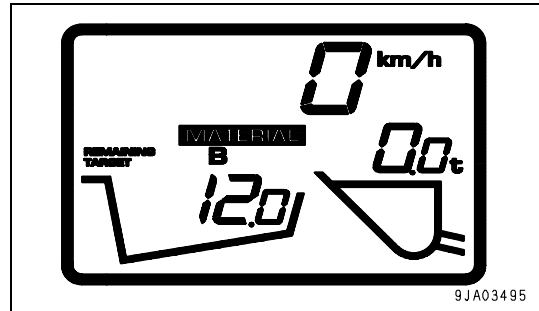
12. At this point, the amount remaining in the bucket (3.1 tons) is subtracted from the target load for the next loading operation, and the result (8.9 tons) is displayed as the target load.

The amount remaining in the bucket is 3.1 tons.
 $12.0 - 3.1 = 8.9$ tons, so 8.9 tons is displayed as the next target load.



13. If the second loading operation is to be carried out without using the load remaining in the bucket, press the load meter cancel switch. The target load will return to the initial setting (12 tons).

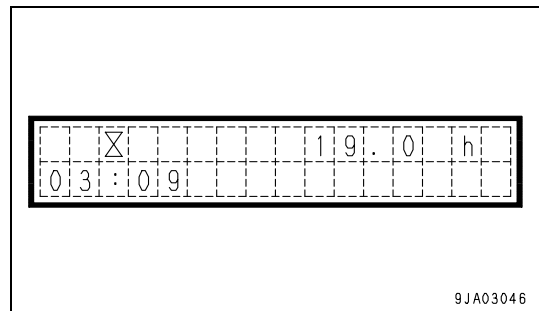
The target load is displayed as 12.0 tons.



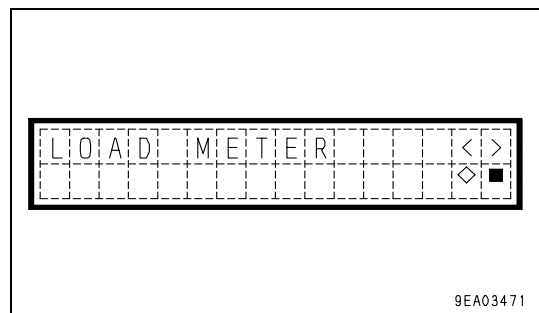
METHOD OF SETTING TIME ON CLOCK

(The time display is only available on machines equipped with the load meter)

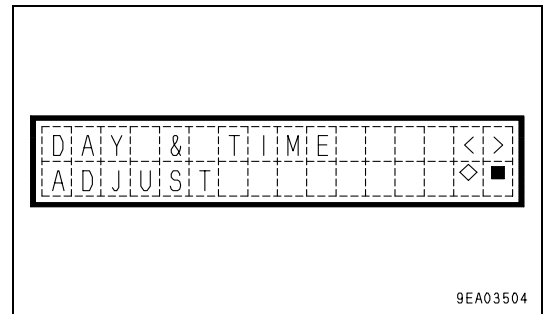
1. Check that the normal service meter and time are displayed on the character display.



2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".



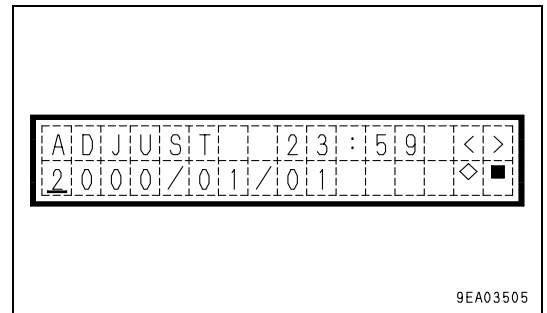
- Press the (◇) of monitor panel mode selector switch 1, then press the (>) or (<) of monitor panel mode selector switch 2 to select "DAY & TIME ADJUST".



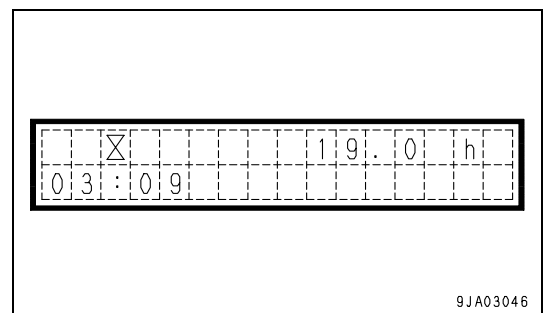
- Press the (◇) of monitor panel mode selector switch 1. The top line displays "ADJUST 23: 59". The bottom line displays "2000/01/01".

REMARK

Once the time is input, the clock will show the correct time from that time on.



- Input the day and time. The cursor is displayed at each input item in the following order: Year, Month, Day, Hour, Minute. Use the (>) or (<) of monitor panel mode selector switch 2 to move the numbers up or down and input numbers between 0 and 9 at the cursor position.
- After inputting the number, press the (◇) of monitor panel mode selector switch 1 to select and move the cursor to the next input position. Repeat Steps 5 and 6 to input and select the numbers from the year to the minute.
- When the (◇) of monitor panel mode selector switch 1 is pressed to select the last digit of the minutes, the character display will return to the normal service meter and time display.
- To stop the input operation midway, or if the input is mistaken, press the (■) of monitor panel mode selector switch 1 to go back to the previous display.



PRINTER OUTPUT

PRINTOUT MODE

(This functions only when the optional printer is installed.)

Three types of output mode (A, B, C) can be selected for the load meter printout. For details, see "PRINTOUT MODE (6-24)".

A mode: Printout of totals

The number of loads and total amount loaded for each type of material are printed out.

B mode: Printout of subtotals

The total for each load, number of loads, and total amount loaded for each type of material are printed out.

C mode: Printout of operating record

In addition to the items printed out in A mode, the maintenance items and time remaining until maintenance are also printed out.

The printouts shown below are examples of the load meter printouts for the WA470.

Ex:

Output with mode A

WA470-5 #70001		
25/OCT/2001 17:30		
Material	Times	Total Load
A	1	2.62t
B	2	6.04t
C	3	7.11t
D	4	9.04t
E	5	14.82t
Total	16	42.25t

Output with mode B

WA470-5 #70001	
25/OCT/2001 17:30	
Material A	
1: 2.62t	
Total: 1 times	2.62t
Material B	
1: 2.62t	2: 3.42t
Total: 2 times	6.04t
Material C	
1: 3.43t	2: 2.25t
3: 1.43t	
Total: 3 times	7.11t
Material D	
1: 1.43t	2: 2.27t
3: 2.05t	4: 3.38t
Total: 4 times	9.04t
Material E	
1: 3.48t	2: 2.94t
3: 3.64t	4: 1.97t
5: 2.79t	
Total: 5 times	14.82t

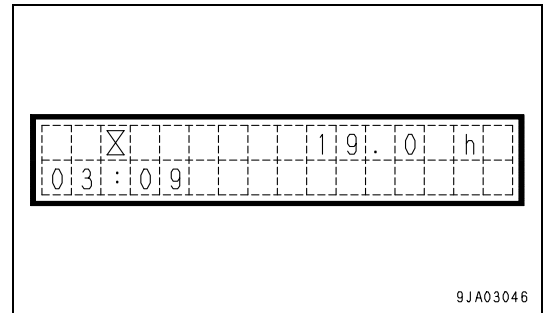
Output with mode C

WA470-5 #70001		
Start time		
25/OCT/2001	9:15	
Service meter 00043.0h		
End time		
25/OCT/2001	17:30	
Service meter 00051.2h		
Material	Times	Total Load
A	1	2.62t
B	2	6.04t
C	3	7.11t
D	4	9.04t
E	5	14.82t
Total	16	42.25t
Maintenance		
Engine oil		250h
Transmission oil		1000h
Hydraulic oil		2000h
Axle oil		2000h
Engine oil filter		250h
Transmission oil filter		500h
Hydraulic oil filter		1000h
Axle pivot pin		50h
Boom pin		100h
Steering cylinder pin		250h
Center hinge pin		1000h

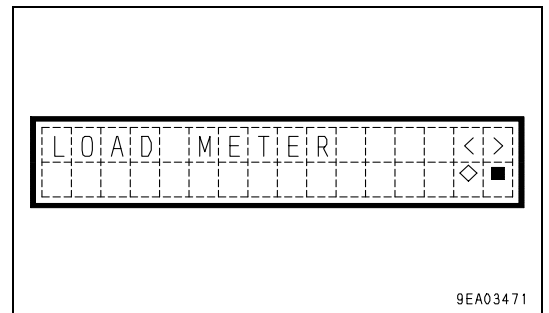
METHOD OF SELECTING PRINTOUT MODE

(This functions only when the optional printer is installed.)

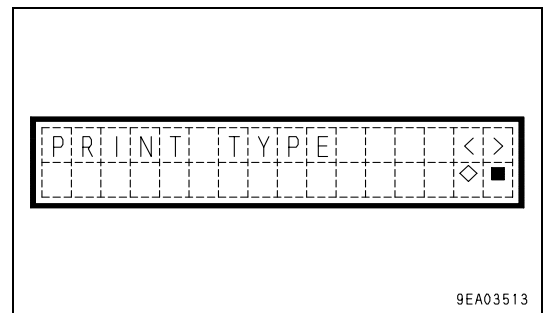
1. Check that the normal service meter and time are displayed on the character display.



2. Press the (◇) of monitor panel selector switch 1 and display "LOAD METER".

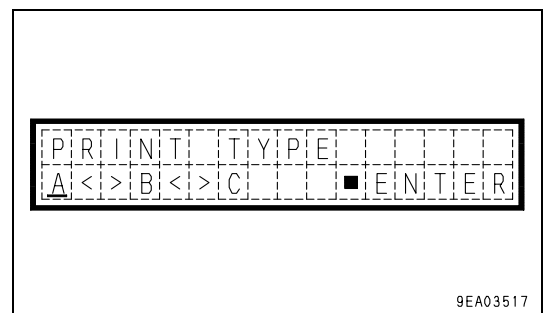


3. Press the (◇) of monitor panel mode selector switch 1, then press the (>) or (<) of monitor panel mode selector switch 2 to select "PRINT TYPE".



4. Press the (◇) of monitor panel mode selector switch 1. The bottom line will change to display the printout mode "A < > B < > C".
5. Press the (>) or (<) of monitor panel mode selector switch 2 to set to the desired printout mode.

Three types of output mode (A, B, C) can be selected for the load meter printout.
For details, see "PRINTOUT MODE (6-24)".



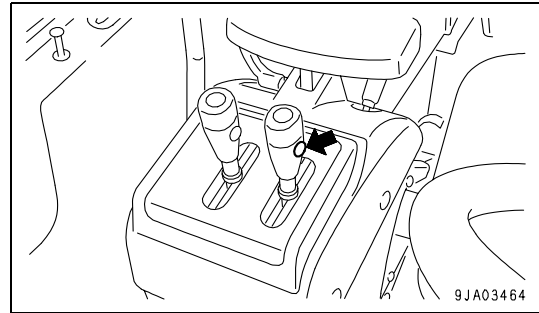
6. After setting the printout mode, press the (■) of monitor panel mode selector switch 1. If the monitor accepts it, the buzzer will give short sounds and the screen will return to the load meter display.

7. To print out in A or B mode, keep the load meter sub total switch pressed for at least 2 seconds and the data will be printed out.

When printing out in C mode, the data will be printed out immediately when C mode is selected in Step 5.

When the C mode printout is finished, the printout mode setting will return to A or B.

8. To stop the input operation midway, or if the input is mistaken, press the (■) of monitor panel mode selector switch 1 to go back to the previous display.



HANDLING TORQUE CONVERTER LOCK-UP

⚠ WARNING

When traveling down slopes of a grade of more than 6°, never depress the accelerator pedal fully, regardless of whether the torque converter lock-up switch is ON or OFF. It is extremely dangerous to drive too fast.

NOTICE

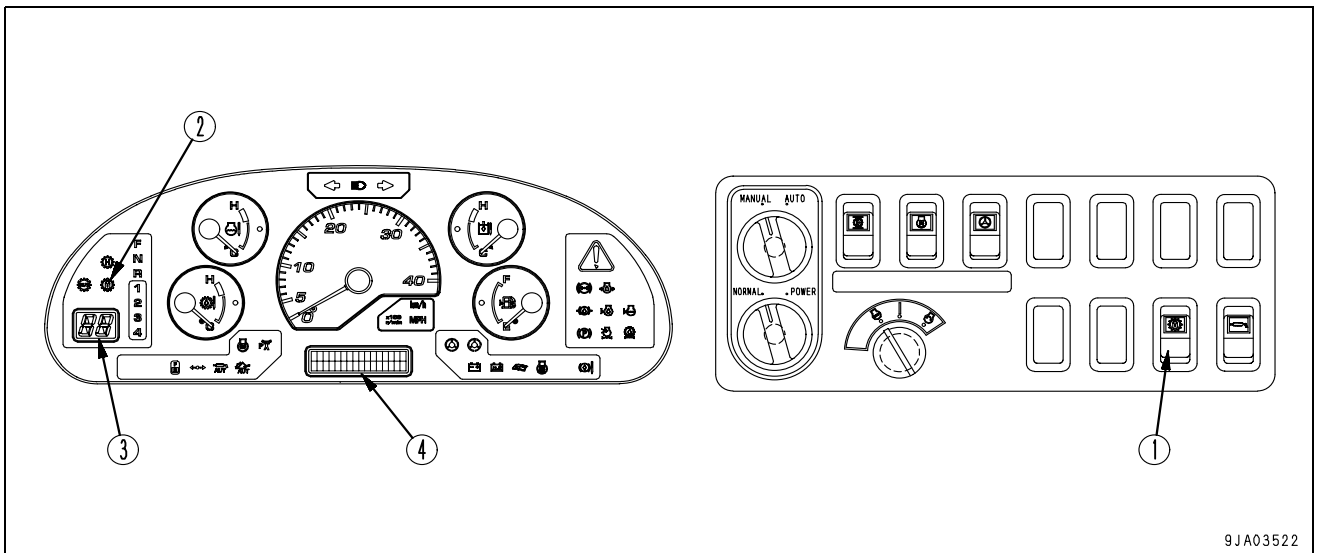
To prevent overrunning when traveling at high speed in the following cases, do not shift down gear.

- When traveling in F3 at a speed of more than 25 km/h (15.5 MPH), do not shift down to F2.
- When traveling in F4 at a speed of more than 36 km/h (22.4 MPH), do not shift down to F3.

When the actual speed range is 3rd or 4th in either FORWARD or REVERSE, the torque converter lock-up function is actuated according to the travel speed and sets to direct drive.

To prevent overrun, the lock-up is automatically canceled to prevent the travel speed from going above 40 km/h (24.9 MPH).

GENERAL LOCATIONS



(1) Torque converter lock-up switch	(3) Shift indicator (displays actual speed range)
(2) Torque converter lock-up pilot lamp	(4) Character display

TORQUE CONVERTER LOCK-UP SWITCH

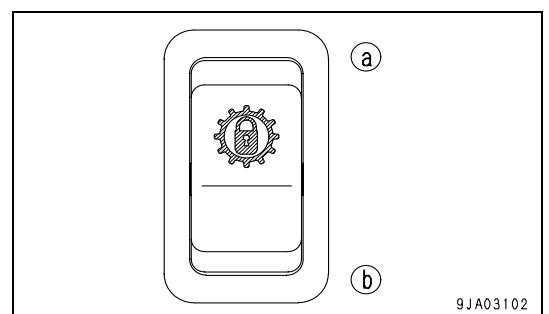
This switch (1) is the control switch for the torque converter lock-up function.

Position (a): ON

The pilot lamp inside the switch lights up and the lock-up is actuated according to the travel speed. While the lock-up is engaged, the lock-up pilot lamp on the machine monitor lights up.

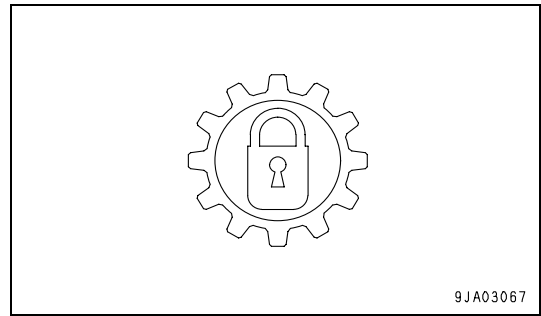
Position (b): OFF

The lock-up does not function.



TORQUE CONVERTER LOCK-UP PILOT LAMP

This monitor (2) lights up when the torque converter lock-up is engaged and the transmission actually enters direct drive.

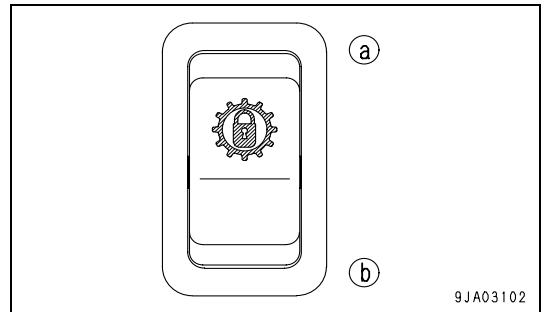


9JA03067

For details of (3) and (4), see "SHIFT INDICATOR (3-27)" and "ACTION CODE DISPLAY (3-9)" in the section on the machine monitor in the OPERATION section.

METHOD OF OPERATION

1. Press the top (a) of the torque converter lock-up switch to turn it ON.
The pilot lamp inside the switch lights up.
2. When the actual speed range is 3rd or 4th in either FORWARD or REVERSE, the torque converter lock-up function is actuated according to the travel speed and sets to direct drive.



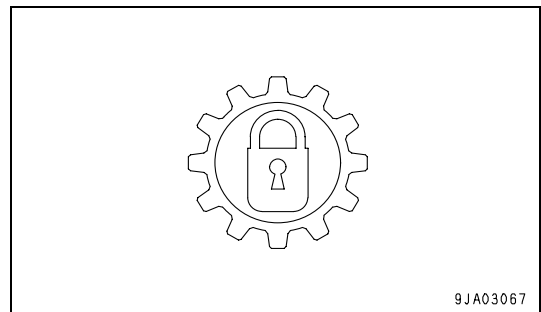
9JA03102

REMARK

When 4th is selected in auto-shift mode, the lock-up is not actuated in 3rd. The lock-up is actuated only in the selected 4th gear.

When the lock-up is actually actuated, the lock-up pilot lamp on the machine monitor lights up.

3. To cancel the lock-up, press the bottom (b) of the torque converter lock-up switch to turn it OFF.
The lock-up is canceled.



9JA03067

The travel speed for actuation and cancellation of the lock-up is as shown below.

Lock-ups Speed range	FORWARD travel speed (km/h (MPH))		REVERSE travel speed (km/h (MPH))	
	Actuated	Canceled	Actuated	Canceled
3rd	11 to 14 (6.8 to 8.7)	10 to 12 (6.2 to 7.5)	16 (9.9)	13 (8.1)
4th	21 to 24 (13.0 to 14.9)	19 (11.0)	22 to 25 (13.7 to 15.5)	20 (12.4)

WARNING/LIMIT FUNCTIONS FOR TRAVEL SPEED**TRAVEL SPEED WARNING FUNCTION**

(This functions even when the torque converter lock-up switch is OFF.)

When the travel speed goes above 38.0 km/h (23.6 MPH), the central warning lamp lights up and the alarm buzzer sounds.

At the same time, "E00 OVERRUN PROTECT" is displayed on the character display.

If the alarm buzzer sounds, depress the brake immediately to slow the machine down.

When the travel speed goes below 36.0 km/h (22.4 MPH), the alarm buzzer stops.

TRAVEL SPEED LIMIT FUNCTION

(This functions only when the torque converter lock-up switch is ON.)

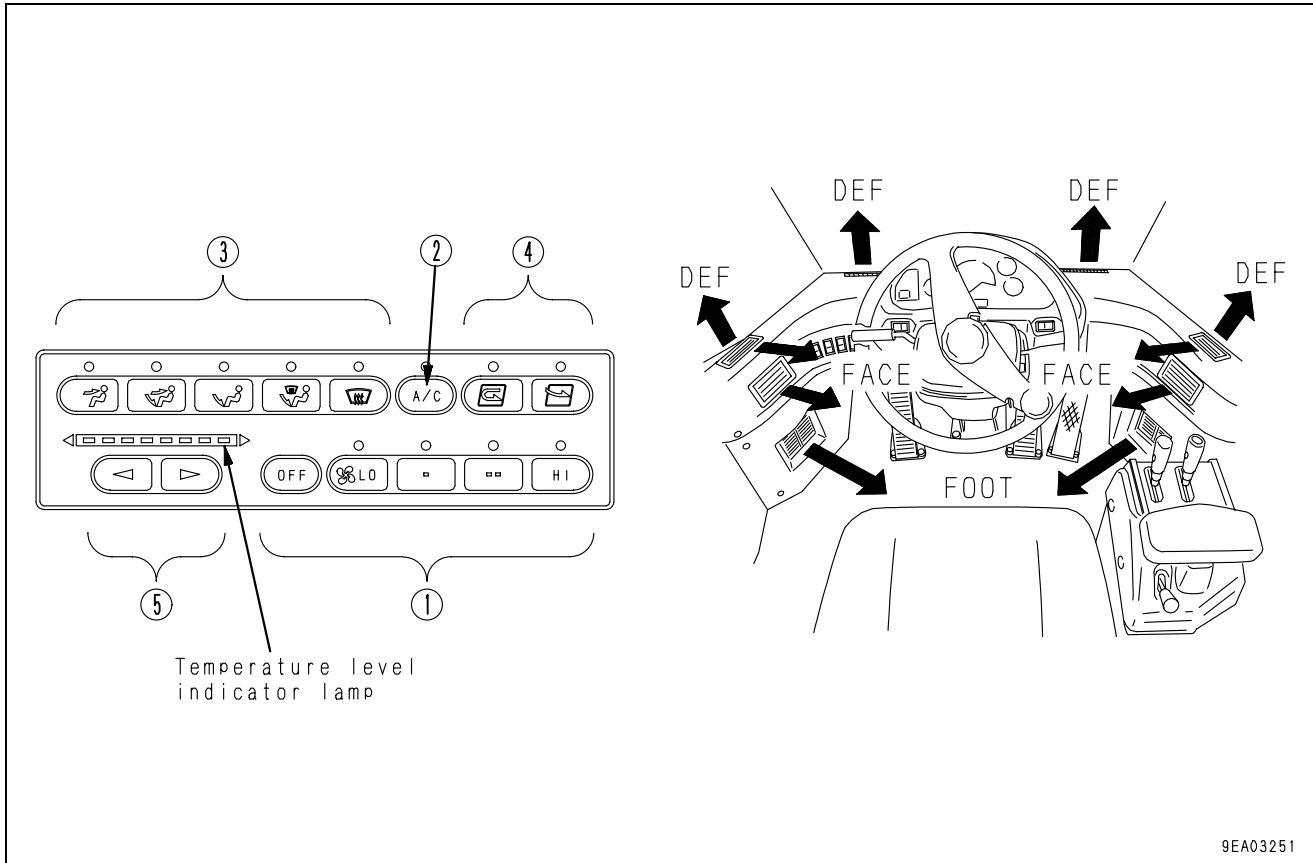
To prevent the travel speed from going above 40.0 km/h (24.9 MPH), the lock-up is automatically canceled.

The lock-up cancel continues until the travel speed goes below 38.0 km/h(23.6 MPH).

AIR CONDITIONER

By taking fresh air into the cab through a filter, it is possible to raise the pressure inside the cab. This makes it possible to provide a pleasant working environment even on dusty jobsites.

GENERAL LOCATIONS AND FUNCTION OF CONTROL PANEL

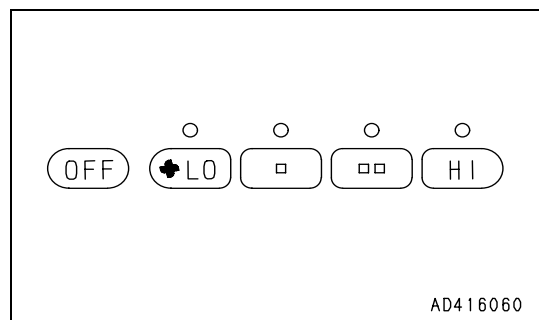


9EA03251

(1) Fan switch	(4) External/Internal air changeover switch
(2) Air conditioner switch	(5) Temperature control switch
(3) Mode selector switch	

FAN SWITCH

This switch (1) can be used to adjust the air flow to four stages. It also acts as the main switch for the air conditioner. When the OFF switch is pressed, the fan stops. When the switch is pressed, the indicator lamp above the switch lights up to display the air flow.

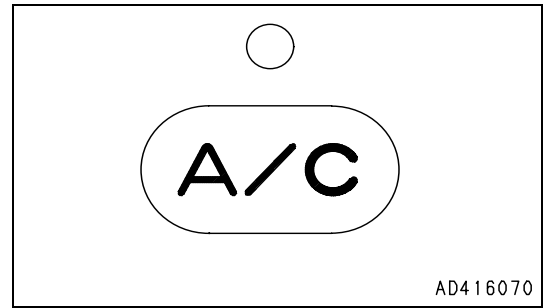


AD416060

AIR CONDITIONER SWITCH

This switch (2) is used to start or stop the cooling or dehumidifying function.

When the fan switch is turned ON and the air conditioner switch is pressed, the indicator lamp above the switch lights up. When the switch is pressed again, the switch is turned OFF and the indicator lamp goes out.

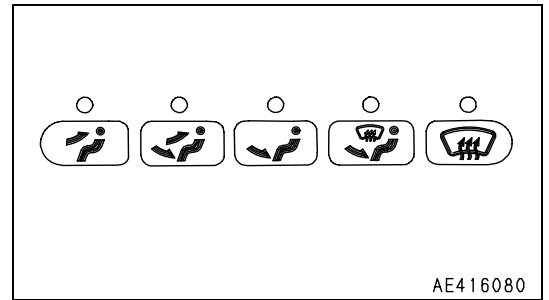


MODE SELECTOR SWITCH

This switch (3) is used to select the vents.

The following five vent modes are available: FACE, FACE/FOOT, FOOT, FOOT/DEF, DEF.

When the switch is pressed, the indicator lamp above the switch lights up to display the vent mode.



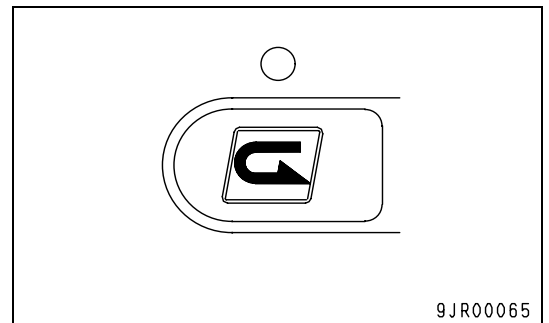
FRESH/RECIRC SELECTOR SWITCH

This switch (4) changes between internal air circulation and external air intake.

When pressing the switch, the indicator lamp on the top of switch lights up.

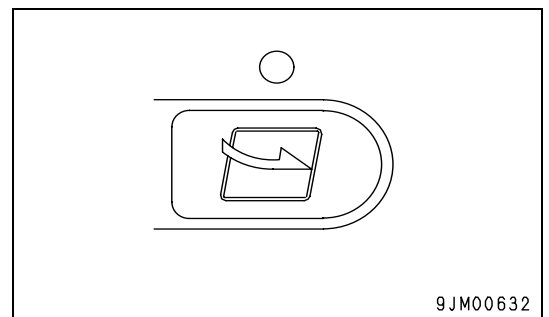
Internal air circulation

This (4) is used when wishing to quickly cool or warm the cab or when the air inside the cab is stale.



External air intake

This (4) is used to cool or warm the cab with the external air intake. Also, it is used for fresh air intake or to remove condensation on windows.



TEMPERATURE CONTROL SWITCH

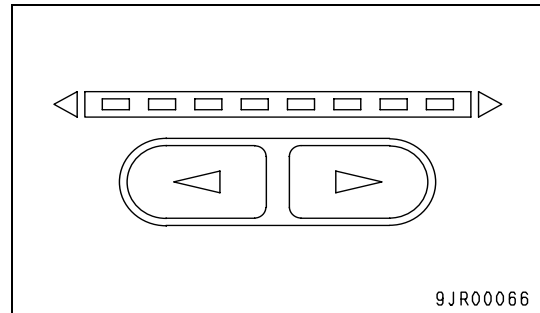
The temperature can be adjusted with this switch (5) steplessly from low temperature to high temperature.

The temperature level indicator lamps light up to display the temperature of the air coming from the vents.

The more the blue lamps light up, the lower the temperature is.

The color of the indicator lamp changes while the switch is being pressed.

When the temperature reaches the desired level, release the switch to set the temperature.



The settings for each mode are retained in memory even when the starting switch is turned OFF.

However, in the following cases, the settings must be made again.

- When the machine has been out of use for more than 7 days
- When the battery voltage is extremely low
- When there has been abnormal interference from outside
- When the fan switch is turned OFF (the setting is not kept in memory with only the air conditioner switch)

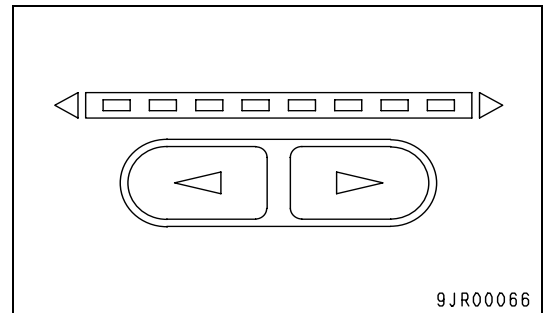
If the air conditioner is used at the FRESH position, the inside of the cab will be pressurized and this will prevent the entry of dust.

The higher the position of the fan switch, the more effective the pressurizing becomes.

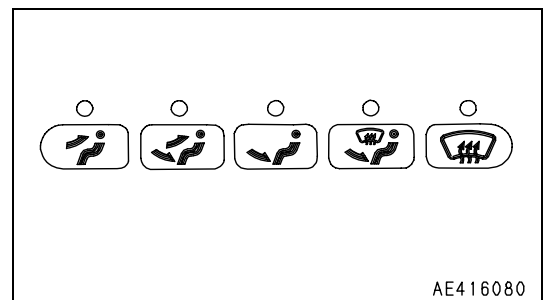
METHOD OF OPERATION

Condition of use		Switches				
		Fan switch	Air conditioner switch	Temperature control switch	FRESH/ RECIRC air changeover switch	Mode selector switch
Cooling	Rapid	HI	ON	All blue	RECIRC	FACE
	Normal	HI-LO	ON	More than half are blue	FRESH	FACE
Dehumidifying, heating		HI-LO	ON	More than half are red	FRESH	FOOT
Heating	Rapid	HI	OFF	All red	RECIRC	FOOT
	Normal	HI-LO	OFF	More than half are red	FRESH	FOOT
Defroster		HI	ON	More than half are red	FRESH	DEF
Vetilation or pressurizing		HI-LO	OFF	All blue	FRESH	FACE

When carrying out the defrosting, if the temperature control switch is set so that all lamps are red, this will improve the performance for defrosting and demisting.



Set the vent mode selector switch to the intermediate position to give the desired condition. With the FACE vents, it is possible to adjust the direction of the air flow and to turn it on or off. However, do not set to the FACE mode with the vents closed.



WHEN NOT USING THE AIR CONDITIONER REGURARLY

Run the air conditioner at cooling or dehumidification + heating for several minutes from time to time to prevent the loss of the oil film at various parts of the compressor.

REMARK

If the temperature inside the cab is low, the air conditioner may not work. In such cases, use the recirculated air to heat up the inside of the cab, then turn the air conditioner switch on to run the air conditioner.

COOL BOX

When the cooling is being used, this can be used for keeping drinks and other things cool.

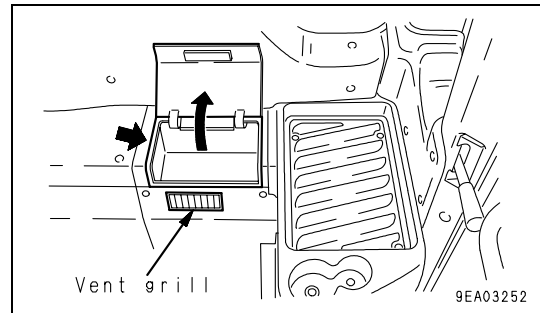
When the heating is being used, it can be used to keep things warm.

When using the box, open the vent grill.

When not using the box, close the grill.

Do not use the cool box for things which smell or leak water or break easily.

Do not use it as a holder for tools or other small objects.

**PRECAUTIONS WHEN USING****PRECAUTIONS WHEN USING THE COOLING**

- If you smoke when using the air conditioner, your eyes may start to itch or burn, therefore ventilate the cab every so often to remove the smoke.
- When using the air conditioner for a long period of time, then carry out ventilation process at least once every hour.

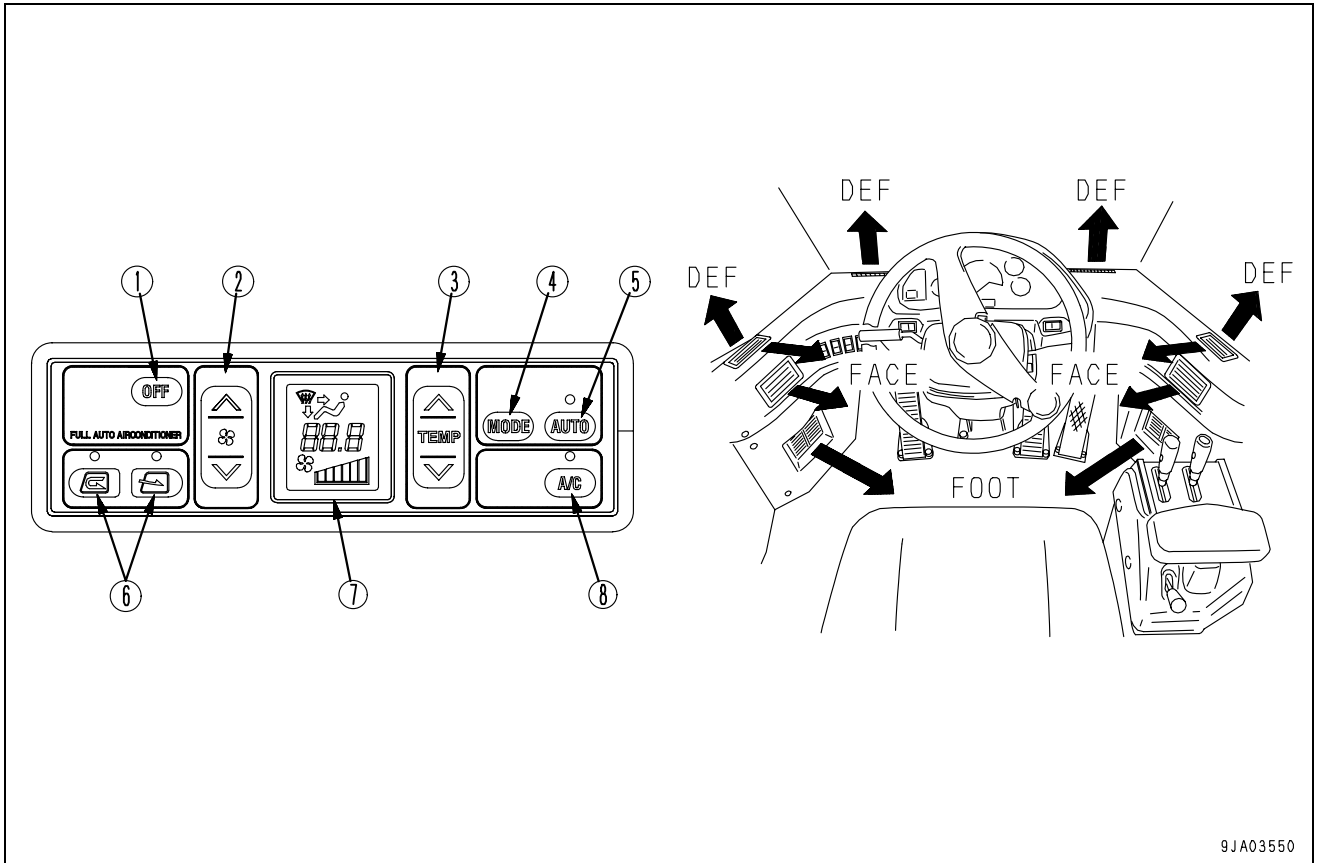
When using the air conditioner, it is recommended for health reasons that it should only feel slightly cooler (5 or 6°C lower than the outside temperature) when you enter the cab.

Be careful then, to adjust the temperature to a suitable level.

HANDLING AUTOMATIC AIR-CONDITIONER

By taking fresh air into the cab through a filter, it is possible to raise the pressure inside the cab. This makes it possible to provide a pleasant working environment even on dusty jobsites.

GENERAL LOCATIONS AND FUNCTIONS OF CONTROL PANEL



9JA03550

(1) OFF switch	(5) Auto switch
(2) Fan switch	(6) RECIRC/FRESH selector switch
(3) Temperature control switch	(7) Monitor panel
(4) Mode selector switch	(8) Air conditioner switch

Even when the starting switch is turned OFF, the mode settings are retained in memory.

OFF SWITCH

This switch (1) turns the fan OFF.

- When OFF switch (1) is pressed, the set temperature and air flow displays on machine monitor (7) and the lamp at the top of auto switch (5) go out.

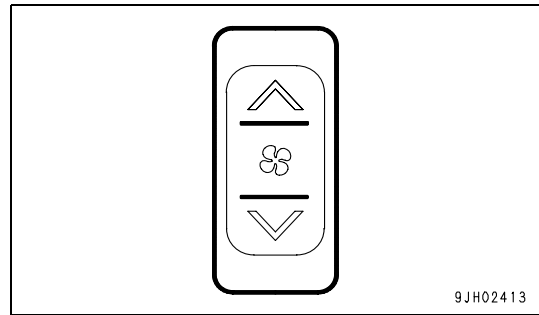


9JH02411

FAN SWITCH

This switch (2) is used to adjust the air flow. The air flow can be adjusted to six levels.

- Press the ^ switch to increase the air flow; press the v switch to reduce the air flow.
- When the fan switch is pressed, the lamp at the top of the auto switch goes out.
- During auto operation, the air flow is automatically adjusted.



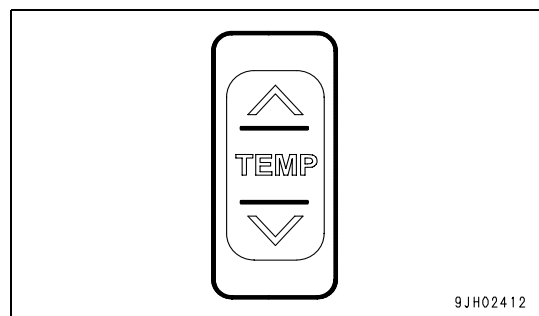
<Monitor display and air flow>

Liquid crystal display	Air flow
	Air flow "low"
	Air flow "medium 1"
	Air flow "medium 2"
	Air flow "medium 3"
	Air flow "medium 4"
	Air flow "high"

TEMPERATURE CONTROL SWITCH

This switch (3) is used to control the temperature inside the cab. The temperature can be set between 18°C (64.4°F) and 30°C (86°F).

- Press the ^ switch to raise the set temperature; press the v switch to lower the set temperature.
- The temperature is generally set at 25°C.
- The temperature can be set in stages of 0.5°C.



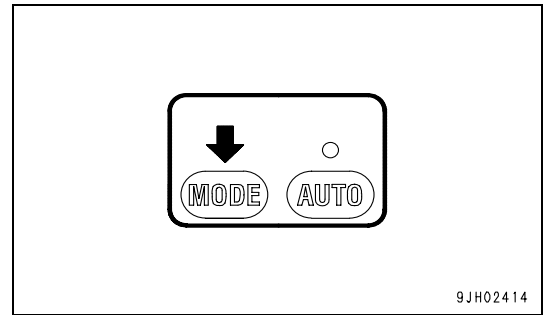
<Monitor display and the function>

Monitor display (°C)	Set temperature
18.0	Max. cooling
18.5 to 31.5	Adjusts temperature inside cab to set temperature
32.0	Max. heating

MODE SELECTOR SWITCH

This switch (4) is used to select the vents.

- The vent position can be selected from five modes: FACE, FACE/FOOT, FOOT, FOOT/DEF, DEF.
- When this switch (4) is pressed, the display on monitor panel (7) changes in turn, and the air blows out from the vents shown in the display.
- During automatic operation, the vents are automatically selected.

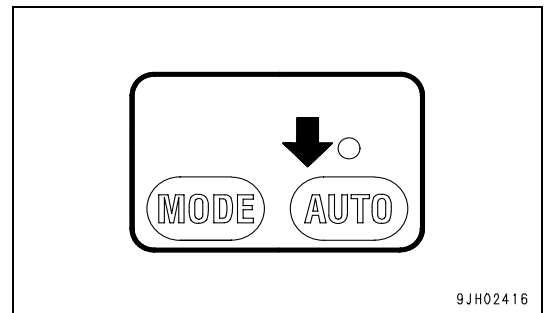


AUTO SWITCH

With this switch (5), the air flow, vents, and air source (RECIRC/FRESH) are automatically selected according to the set temperature.

This switch also acts as the air conditioner main switch.

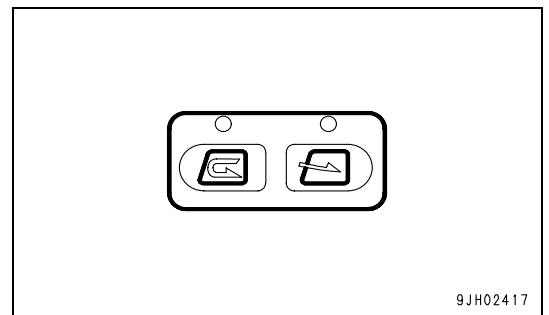
- When auto switch (5) is pressed, the lamp at the top of the auto switch lights up and the auto mode is displayed.
- When the fan switch is pressed, the lamp at the top of the auto switch goes out.
- Normally, press this switch, then use temperature control switch (3) to set the temperature, and run the air conditioner under automatic control.
- When the control is switched from automatic operation to manual operation, it is possible to operate the switch to change the air flow, vents, and air source (RECIRC/FRESH). When the manual control is used, the lamp at the top of the auto switch goes out.



RECIRC/FRESH SELECTOR SWITCH

This switch (6) is used to switch the air source between recirculation of the air inside the cab and intake of air from the outside.

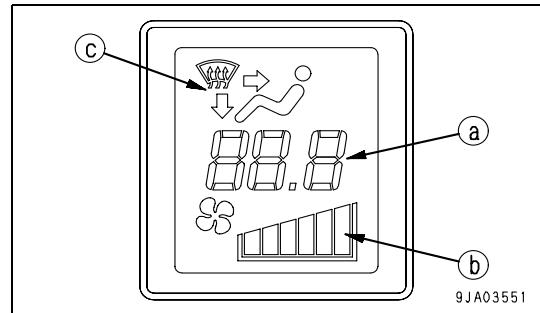
- When switch (6) is pressed, the lamp at the top of the selector switch lights up to show that air is being blown out.
- During automatic operation, the selection of inside air (RECIRC) and outside air (FRESH) is carried out automatically.



RECIRC	The outside air is shut off and only the air inside the cab is circulated. Use this position to carry out rapid cooling of the cab or when the outside air is dirty.
FRESH	Outside air is taken into the cab. Use this position to take in fresh air or when carrying out demisting.

MONITOR PANEL

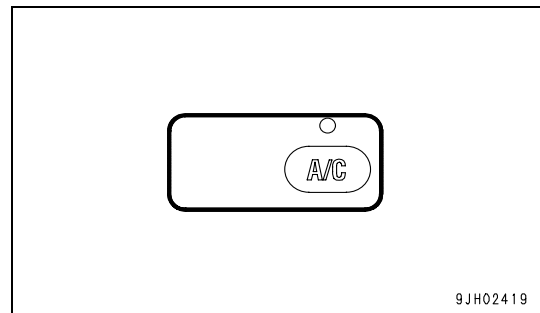
The monitor panel shows the temperature setting (a), air flow (b), and vent selection ©.



AIR CONDITIONER SWITCH

This switch (8) is used to turn the air conditioner (cooling, dehumidifying, heating) ON or OFF.

- When the auto switch or fan switch is turned ON and air conditioner switch (8) is pressed, the air conditioner is switched ON, the lamp at the top of the air conditioner switch lights up, and the air conditioner starts. When it is pressed again to the OFF position, the lamp at the top of the air conditioner switch goes out.
- The air conditioner cannot be operated while the fan is stopped.

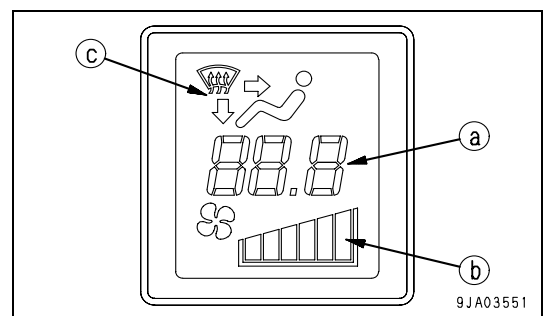
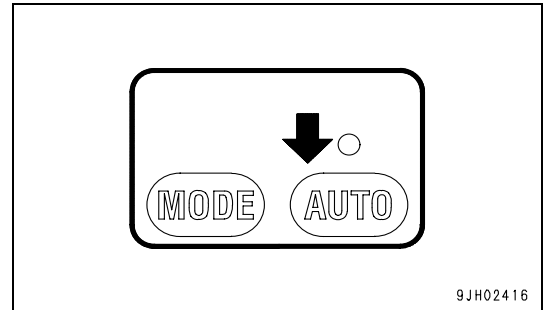


METHOD OF OPERATION

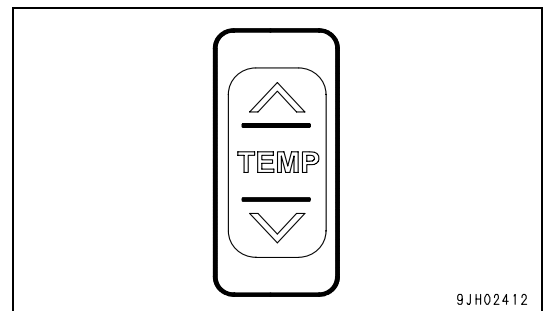
The air conditioner can be operated automatically or manually. Select the method of operation as desired.

AUTOMATIC OPERATION

1. Turn auto switch (5) ON.
 - The lamp at the top of switch (5) lights up.
 - The set temperature (a) and air flow (b) are displayed on the monitor.



2. Operate temperature control switch (3) to set to the desired temperature. The air flow, vents, and air source (RECIRC/FRESH) are selected automatically and the air conditioner is run automatically to bring the temperature to the set temperature.



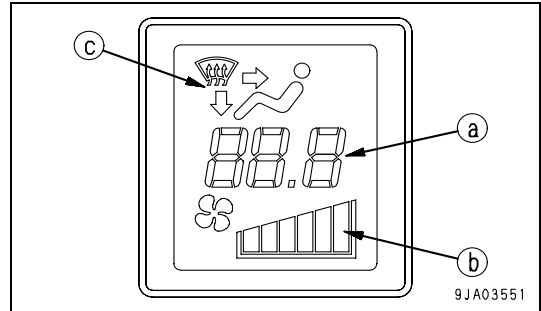
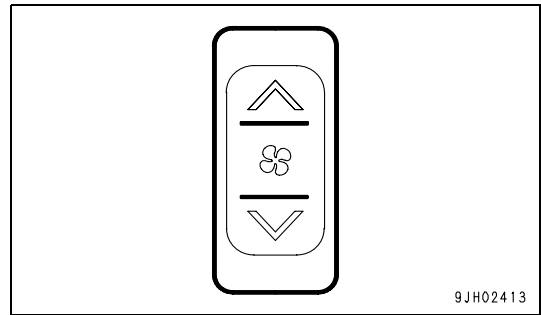
STOPPING AUTOMATIC OPERATION

Press OFF switch (1). The display of the set temperature (a) and air flow (b) on the monitor panel, and the lamps at the top of auto switch (5) and air conditioner switch (8) go out, and the air conditioner stops.

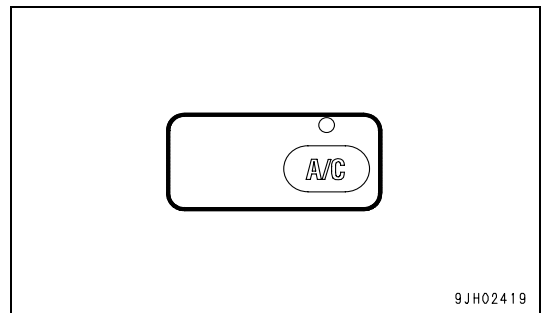


MANUAL OPERATION

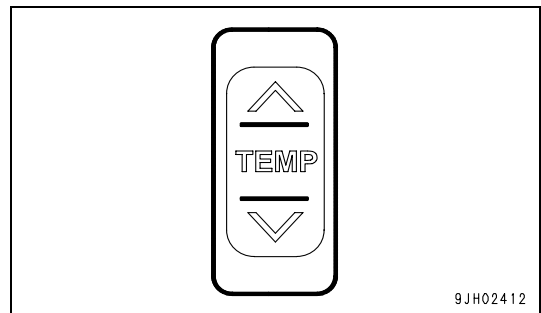
1. Press fan switch (2) and select the air flow. Check that the set temperature (a) and air flow (b) are displayed on the monitor panel.



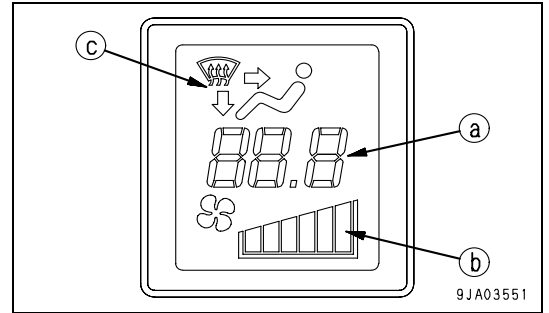
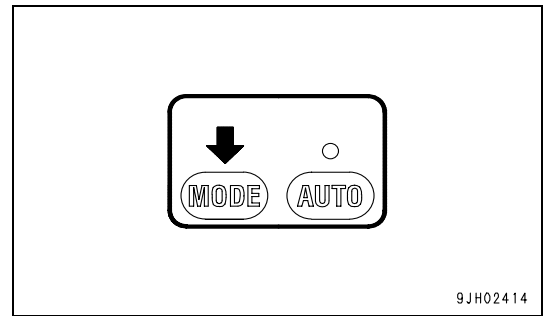
2. Turn air conditioner switch (8) ON. Check that the lamp at the top of the air conditioner switch lights up.



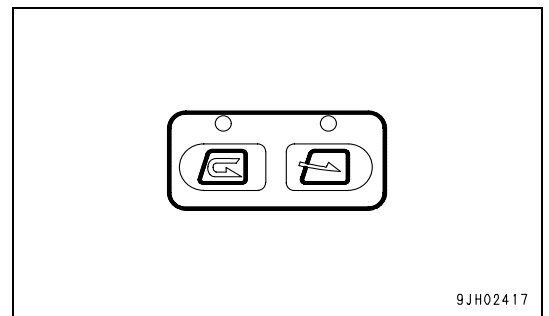
3. Press temperature control switch (3) to set the temperature inside the cab.



- Press mode selector switch (4) and select the desired vent. The display of the vent selection © on the monitor panel will change according to the selection.



- Press RECIRC/FRESH selector switch (6) and select recirculation of the air inside the cab (RECIRC) or intake of fresh air from outside (FRESH).



STOPPING MANUAL OPERATION

Press OFF switch (1). The display of the set temperature (a) and air flow (b) on the monitor panel, and the lamps at the top of auto switch (5) and air conditioner switch (8) go out, and the air conditioner stops.



PRECAUTIONS WHEN USING

For the precautions when using the air conditioner, see "PRECAUTIONS WHEN USING (6-34)" in the section on the air conditioner in the ATTACHMENTS, OPTIONS section.

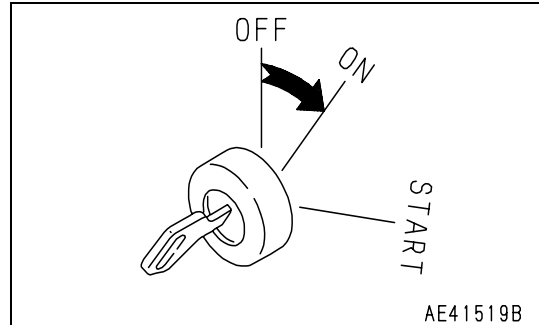
INSPECTION AND MAINTENANCE

When carrying out inspection and maintenance of a machine equipped with air conditioner, see "MAINTENANCE SCHEDULE CHART (4-15)".

CENTRAL LUBRICATION

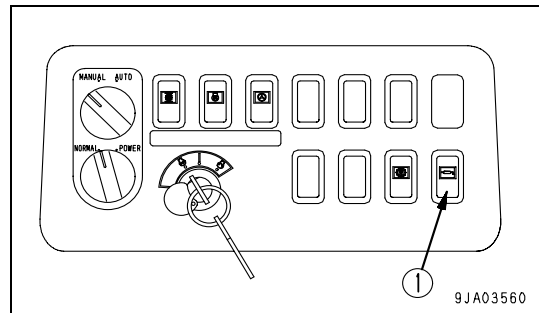
OPERATION

Turn the starting switch ON.



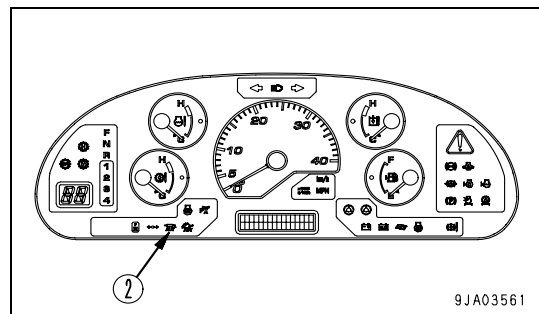
OPERATION AS DESIRED

If auto-greasing switch (1) on the right switch panel or the start button of the lubrication controller inside the box under the step on the left side of the machine are pressed, one cycle of greasing will be carried out regardless of the hours of operation. The time count for the greasing interval will be canceled, and when the electric pump automatically stops, the count will start again.

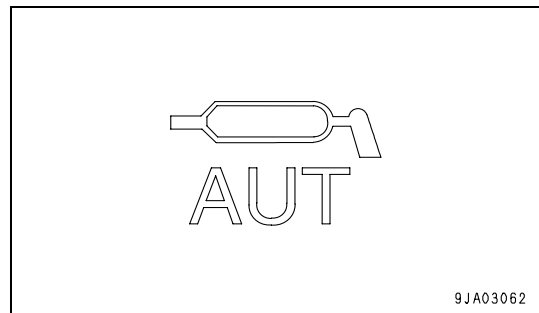


PILOT LAMP DISPLAY ON MACHINE MONITOR

The display of pilot lamp (2) on the machine monitor lights up or flashes according to the following conditions.



- Lighted up: Normal operation
- 1 flash per sec: Grease cartridge empty
- 2 flashes per sec: Defective decompression



The settings when shipping from the factory are as follows.
 Greasing interval: 1 hour
 Greasing time: 12 minutes

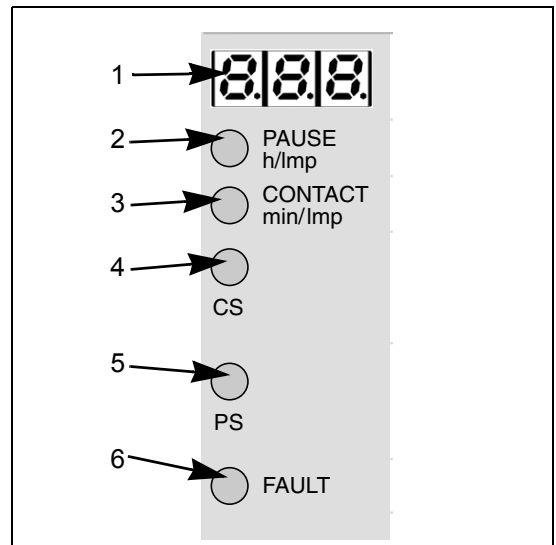
DISPLAY AND CONTROL UNIT

The display and control unit is protected by a transparent plastic cover against splashing water and mechanical damage. For programming, the cover has to be dismantled and, following programming, reattached with a screwdriver.



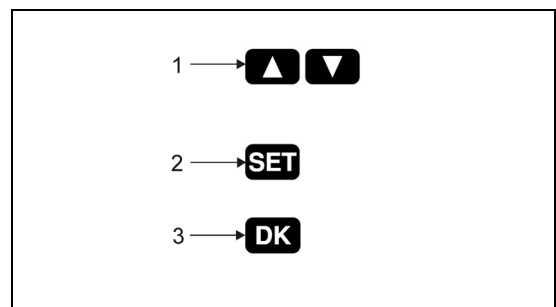
LED-DISPLAY

1. Seven-segment display: Values and operating state
2. Pause time (PAUSE h/Imp)
3. Pump operation (CONTACT min/Imp)
4. Monitoring of system function by means of an external cycle switch (CS)
5. Monitoring of system function by means of an external pressure switch (PS)
6. Fault message (FAULT)



PUSHBUTTONS

1. Turn on display
 Display values and parameters
 Set values and parameters
2. Change between programming and display mode
 Confirm values (SET)
3. Activate intermediate lubrication
 Clear fault message (DK)

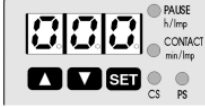
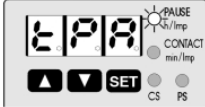
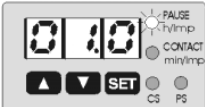

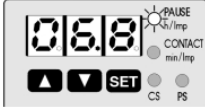

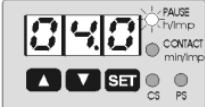




CHANGING THE LUBRICATION INTERVAL TIMES

The settings when shipping from factory are as follows:

Greasing interval: after 1 hour

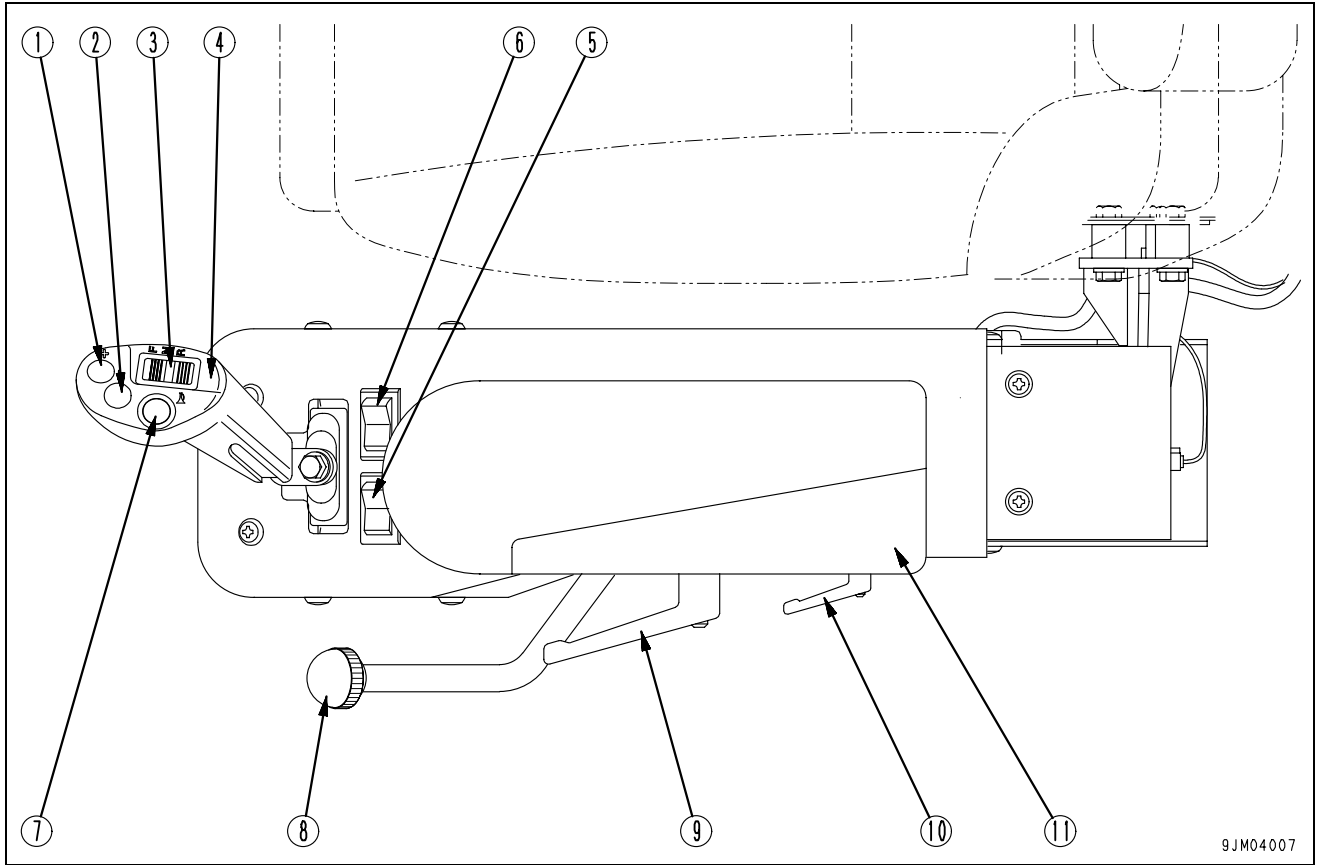
Greasing time: 12 minutes.

Step	Key	Display
1	SET Press for more than 2s	 000 in display flashes
2	SET Press briefly (confirm code)	 Automatically indicates first parameter Example: „Pause in timer operation“ LED „Pause“ flashes
3	SET Press briefly	 Pause time 1 h
4		 Set new value Example: 6.8 h = 6 h 48 min
5	SET Press briefly (confirm new value)	 Indicates next parameter „Pump running time in timer mode“ LED „Contact“ flashes
6	SET Press briefly	 Pump running time 4 min
7		 Set new value Example: 3 min
8	SET Press briefly	Confirm new value
9	SET Press for more than 2s	Changes are written to the memory, and the LED indicators extinguish.

HANDLING JOYSTICK STEERING SYSTEM

To enable you to use the joystick steering safely and efficiently, please read the following before using it.

EXPLANATION OF COMPONENTS



9JM04007

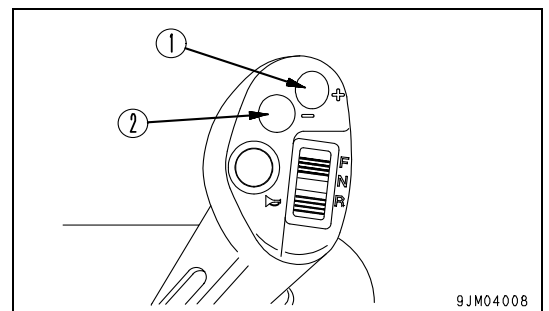
(1) Shift up switch	(7) Horn switch
(2) Shift down switch	(8) Console lock lever
(3) FNR switch	(9) Height adjustment lock lever
(4) Joystick steering lever	(10) Angle, fore/aft adjustment lock lever
(5) Joystick ON/OFF switch	(11) Console
(6) HI/LOW selector switch	

SHIFT UP, SHIFT DOWN SWITCHES

These switches (1) and (2) are used when shifting up or down, regardless of whether the transmission is in the manual shift mode.

Press (1): Shift up

Press (2): Shift down



9JM04008

FNR SWITCH

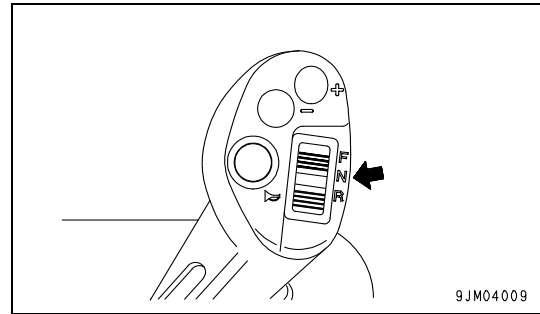
The F/N/R switch (3) at the top of the joystick steering lever is used to switch the transmission between FORWARD and REVERSE.

(F) position: FORWARD

(N) position: Neutral

(R) position: REVERSE

Use the shift up and shift down switches at the top of the joystick steering lever to change the speed range.



9JM04009

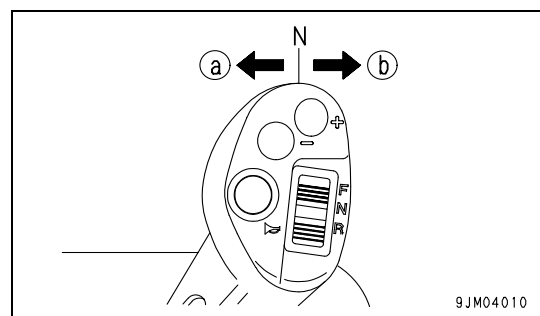
JOYSTICK STEERING LEVER

Use this lever (4) to steer the machine to the left or right. When traveling, operate this lever in the direction to turn the machine.

(a): Left turn

(b): Right turn

(N): Neutral



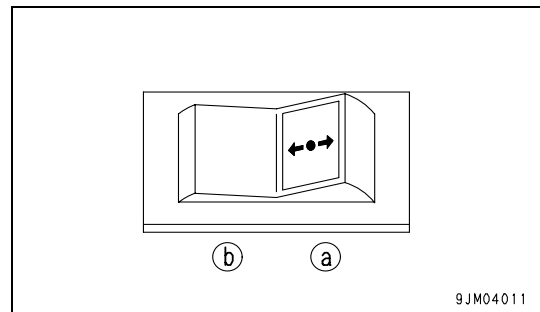
9JM04010

JOYSTICK ON/OFF SWITCH

When this switch (5) is turned ON, the joystick steering is switched ON.

Position (a): ON (possible to steer with joystick)

Position (b): OFF (impossible to steer with joystick)



9JM04011

HI/LOW SELECTOR SWITCH

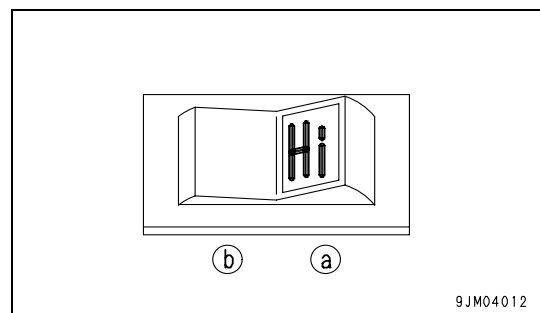
This switch (6) is used to switch the steering speed between HIGH and LOW.

Position (a): HI

The articulating speed of the machine is high in relationship to the operation of the joystick steering lever, so this setting is suitable for comparatively fast cycle times.

Position (b): LOW

The articulating speed of the machine is low in relationship to the operation of the joystick steering lever, so this setting is suitable for operations loading loose materials and materials that easily spill.

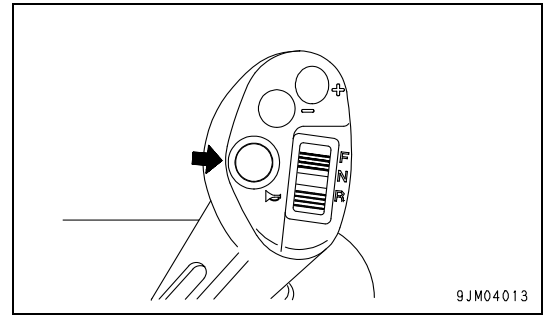


9JM04012

HORN SWITCH

Press this switch (7) at the top of the joystick steering lever to sound the horn.

By using this switch, it is possible to sound the horn without taking your hand off the lever.



CONSOLE LOCK LEVER

For details of this lever (8), see “GETTING IN OR OUT OF OPERATOR’S CAB (6-49)”.

HEIGHT ADJUSTMENT LOCK LEVER

For details of this lever (9), see “ADJUSTMENT OF JOYSTICK CONSOLE (6-49)”.

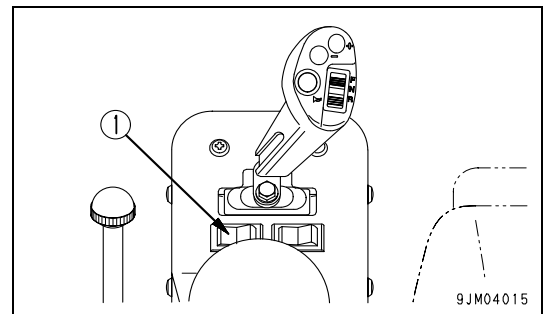
ANGLE, FORE/AFT ADJUSTMENT LOCK LEVER

For details of this lever (10), see “ADJUSTMENT OF JOYSTICK CONSOLE (6-49)”.

STRUCTURE AND FUNCTION OF JOYSTICK STEERING

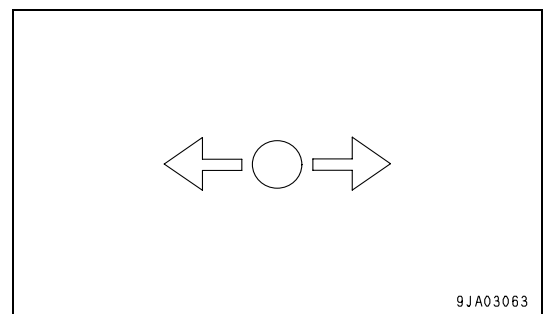
- The joystick steering system is a system used to steer wheel loaders with a lever instead of a steering wheel. The joystick enables steering with small, light movements, and helps to reduce operator fatigue.

When joystick ON/OFF switch (1) is turned ON, it becomes possible to operate the steering with the joystick.



When the joystick steering is in use, the joystick pilot lamp on the machine monitor lights up.

- On machines equipped with the joystick steering system, it is possible to use joystick ON/OFF switch (1) to select the steering and transmission operation method as shown in the table below. In addition, on machines equipped with joystick steering, the transmission auto shift function is also included. The differences between operation using the joystick lever and operation using the steering wheel are as follows.



Selection		Operation using joystick lever		Operation using steering wheel	
Joystick ON/OFF switch		ON		OFF	
Steering		Steering using joystick lever (steering with steering wheel is also possible)		Steering using steering wheel	
Transmission	F/N/R	Operation using FNR switch at top of joystick lever		Operation using transmission directional lever	
	Transmission type	Auto		Auto	
	Shift mode selector switch	Manual	Auto (L, M, H)	Manual	Auto (L, M, H)
	Selection of speed range	Speed range selection using shift up, shift down switches at top of joystick lever *	Automatic gear-shifting according to travel speed	Operation using gearshift lever	Automatic gear-shifting according to travel speed

*: Does not shift up above speed range of gearshift lever.

OPERATION USING JOYSTICK LEVER AND OPERATION USING STEERING WHEEL

 CAUTION

- If the directional lever and joystick FNR switch are not at the neutral position, the neutral interlock circuit makes it impossible to switch the transmission directional control (when the joystick ON/OFF switch is ON, it is switched from the directional lever to the joystick FNR switch; when the joystick ON/OFF switch is OFF, it is switched from the joystick FNR switch to the directional lever).
- Do not use the joystick when traveling on public roads.

Select lever operation or steering wheel operation according to the work.

- Steering using joystick lever
This is suited for continuous loading operations on jobsites with ample space where the loading operation can be carried out with a comparatively relaxed cycle time. Because operations can be carried out with a small movements and light operating effort, this is also suitable for reducing operator fatigue when operating continuously.
- Steering using steering wheel
This provides excellent fine control and ability to travel straight, so it is suitable for travel between jobsites and for load and carry operations. In addition, it is also suitable for short cycle loading operations because it holds the upper part of the operator's body when frequently switching between FORWARD and REVERSE.

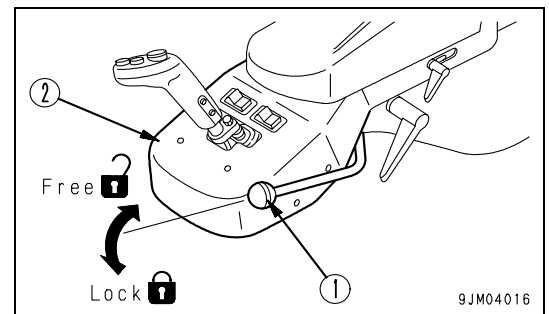
GETTING IN OR OUT OF OPERATOR'S CAB

! WARNING

Always spring the joystick console up before getting in or out of the operator's cab. If the console is sprung up, the safety switch is turned OFF and the joystick is automatically stopped from operating.

The joystick console is a spring-up type to make it easier for the operator to get in and out of the operator's cab. If the joystick lever is moved accidentally when the engine is running, the machine may articulate unexpectedly. To prevent this danger, always spring the joystick console up when not using the joystick for operations and when getting in or out of the operator's cab.

1. Set lock lever (1) to the FREE position.
2. Spring console (2) up.
Turn it at least 90 degrees.
The safety switch is turned OFF and the joystick cannot be operated.
3. When operating, lower joystick console (2) and push lock lever (1) down to the LOCK position. The safety switch is turned ON and the joystick can be selected.



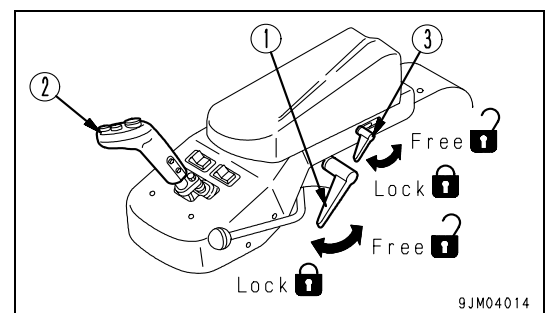
ADJUSTMENT OF JOYSTICK CONSOLE

! WARNING

- Stop the machine on level ground in a safe place when carrying out the adjustment.
- Carry out the adjustment before starting operations or when changing operator shifts.
- Put your back against the backrest of the operator's seat and adjust the seat so that it is possible to depress the brake fully, then adjust the console.

Adjusting height

1. Operate lever (1) in the cancel direction and loosen the lock.
2. Adjust the height of the console and set joystick lever (2) to the desired position.
Amount of adjustment: 30 mm (1.2 in)
3. After setting, operate lever (1) to the LOCK position to lock it securely in position.

**Adjusting angle, fore/aft position**

1. Operate lever (3) in the cancel direction and loosen the lock.
2. Adjust the console and set joystick lever (2) to the desired position.
Amount of fore/aft adjustment: 45 mm (1.8 in)
3. After setting, operate lever (3) to the LOCK position to lock it securely in position.

OPERATION METHOD OF JOYSTICK STEERING SYSTEM

⚠ WARNING

- It is dangerous to turn the machine suddenly at high speed, or to turn on steep hills. Do not operate the steering in such conditions.
- When turning, the articulation stops at the position where the steering wheel is turned to, but if the joystick is held in an operated position, the body will articulate fully.
- The feeling when operating the steering with the joystick is different from when operating with the steering wheel, so be extremely careful until you have become used to operating the joystick.

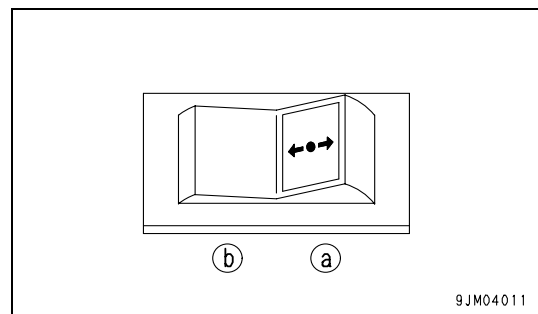
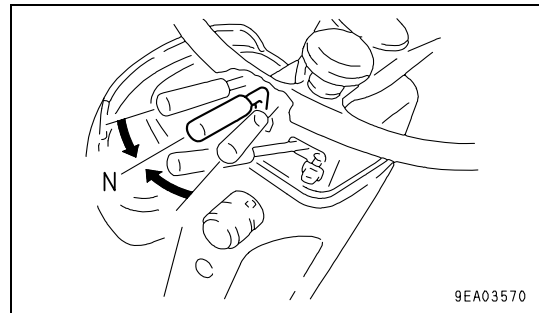
Check the adjustment and operation before starting the engine. For details, see "CHECK BEFORE STARTING ENGINE, ADJUST (3-66)".

1. Before starting the engine, check the operation of the joystick lever steering, check that the transmission directional lever is at N, and that the surrounding area is safe.

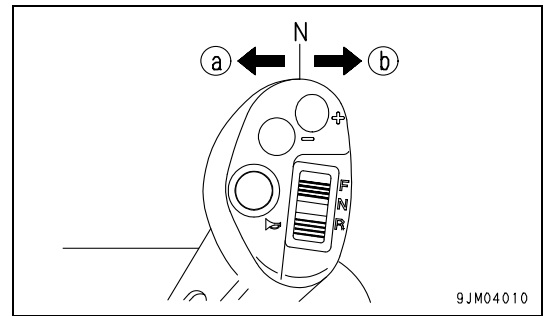
REMARK

Under the following conditions, a warning may be given when the engine is started.

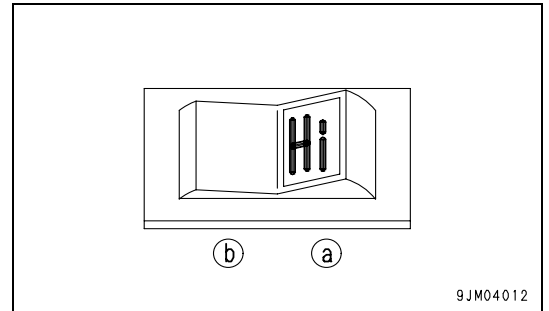
- If the joystick control lever FNR switch is at F or R, the joystick pilot lamp flashes, the central warning lamp lights up, and the alarm buzzer sounds.
 - At the same time, "E00 J/S SW NEUTRAL" is displayed on the character display. In this condition, the engine will not start, so set the FNR switch to N.
 - If the joystick is not at the N position, the joystick pilot lamp flashes, the central warning lamp lights up, and the alarm buzzer sounds.
 - At the same time, "E00 J/S LEVER POSI" is displayed on the character display. In this condition, the engine will not start, so set the joystick lever to the N position.
2. Press the (a) part of the joystick ON/OFF switch to turn it ON.



- Operate the joystick lever in direction (b) to turn the machine to the right; operate it in direction (a) to turn the machine to the left.
The greater the angle of operation, the faster the articulating speed becomes.

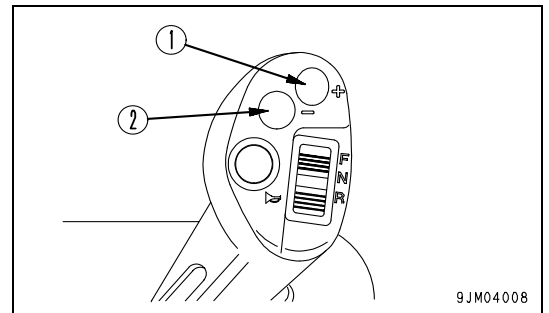


- It is possible to switch the articulating speed with the HI/LOW selector switch.
Select the speed to match the operation.
- When the machine has articulated to the desired angle, return the joystick lever to the N position.
The joystick lever will return automatically to the N position.
- To return the direction of travel of the machine so that it travels in a straight line, operate the joystick lever in the opposite direction from the N position (for example, when the machine is articulated to the right, operate the joystick lever to the left).
- Use the FNR switch at the top of the joystick lever to set the transmission to the direction of travel.
N position: Neutral
F position: FORWARD
R position: REVERSE



REMARK

If the position of the directional lever and the FNR switch are different, the joystick pilot lamp flashes, the warning lamp lights up, and the alarm buzzer sounds. At the same time, "E00 SHIFT LEVER NEUTRAL" is displayed on the character display. In this condition, the machine will travel in the direction set by the directional lever, so set the directional lever to N.



8. To change the speed range, use shift up switch (1) or shift down switch (2) on the joystick lever.

REMARK

The joystick steering is unstable and dangerous to operate at high speeds, so it is set so that the machine cannot travel in 4th.

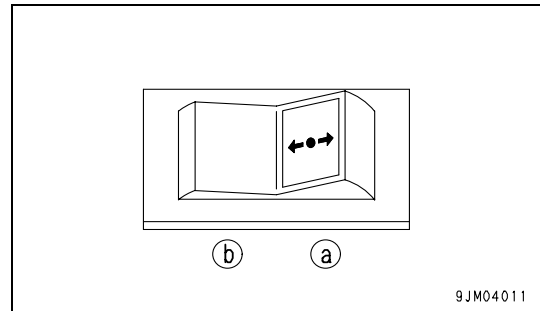
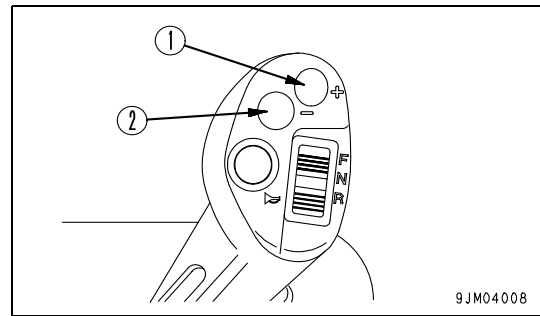
When joystick operation is selected, if the gear shift lever is moved to 4th, or the joystick ON/OFF switch is turned ON when the gear shift lever is at 4th, the central warning lamp lights up and the alarm buzzer sounds.

At the same time, "E00 SHIFT LEVER" is displayed on the character display.

Set the gear shift lever within the range from 1st to 3rd.

In addition, when joystick operation is selected, for machines equipped with a torque converter lock up (option), the system is designed so that the machine does not travel at high speed even if the torque converter lock up switch is turned ON.

9. Press part (b) of the joystick ON/OFF switch to turn it OFF.
The joystick operation is then canceled.



INDEX

- A**
- ADJUSTING WORK EQUIPMENT POSTURE 3-109
 - AFTER STARTING ENGINE
 - OPERATIONS 3-84
 - AFTER STOPPING ENGINE
 - CHECKS 3-86
 - AIR CONDITIONER 6-30
 - FUNCTION OF CONTROL PANEL 6-30
 - GENERAL LOCATIONS 6-30
 - METHOD OF OPERATION 6-33
 - PRECAUTIONS WHEN USING 6-34
 - ATTACHMENTS 6-1
- B**
- BACKUP ALARM 3-61
 - BEFORE STARTING ENGINE
 - ADJUST 3-66
 - CHECK 3-66
- C**
- CAB DOOR OPEN LOCK 3-61
 - CAB WINDOW OPEN LOCK CANCEL KNOB 3-61
 - CAB WIPER 3-65
 - CAP WITH LOCK 3-58
 - CE-CONFORMING EQUIPMENT 1-18, 1-19
 - CENTRAL LUBRICATION 6-42
 - OPERATION 6-42
 - PILOT LAMP 3-26
 - COLD WEATHER OPERATION 3-122
 - AFTER COLD WEATHER 3-123
 - AFTER COMPLETION OF WORK 3-123
 - FOR LOW TEMPERATURE 3-122
 - FOR STEERING HYDRAULIC CIRCUIT 3-124
 - COMPONENTS
 - EXPLANATION OF 3-6
 - CONTROL LEVERS 3-51
 - COOLANT 4-8
 - FILLING CAPACITIES 4-9
- D**
- DIRECTIONS OF MACHINE 1-6
 - DISTRIBUTOR
 - TABLE 1-9
 - DMENSIONS 1-17
 - DUST INDICATOR 3-65
- E**
- ELECTRIC SYSTEM
 - OUTLINE OF 4-6
 - EMERGENCY LOWERING SYSTEM 2-17
 - ENGINE SERIAL NO. PLATE AND POSITION 1-7
 - EQUIPMENT, CE-CONFORMING 1-18
 - EU DIRECTIVES 1-3
- F**
- FIRE EXTINGUISHER 2-5
 - FIRST AID KIT 2-5
 - FOREWORD 1-2
 - FUEL 4-8
 - FILLING CAPACITIES 4-9
 - FUSE 3-62
- G**
- GENERAL VIEW 3-2
 - GENERAL VIEW OF CONTROLS AND GAUGES 3-3
 - GENERAL VIEW OF MACHINE 3-2
 - GREASE PUMP 3-60
- I**
- INFORMATION 1-7
 - INTRODUCTION 1-6
- J**
- JOYSTICK STEERING SYSTEM 6-45
 - ADJUSTMENT OF JOYSTICK CONSOLE 6-49
 - EXPLANATION OF COMPONENTS 6-45
 - FUNCTION 6-47
 - GETTING IN OR OUT OF OPERATOR'S CAB 6-49
 - OPERATION METHOD 6-50
 - STRUCTURE 6-47
- L**
- LIFTING MACHINE 3-119
 - LOAD METER 6-2
 - DISPLAY 6-7
 - FUNCTIONS 6-4
 - MACHINE MONITOR WITH 6-2
 - PRINTER OUTPUT 6-24
 - SWITCHES 6-3
 - LOCKING 3-114
 - LONG-TERM STORAGE 3-125
 - AFTER STORAGE 3-125
 - BEFORE STORAGE 3-125
 - DURING STORAGE 3-125
 - LUBRICANTS 4-8
 - FILLING CAPACITIES 4-9
 - LUBRICATION CHART 4-8
- M**
- MACHINE MONITOR 3-6
 - MACHINE SERIAL NO. PLATE AND POSITION 1-7
 - MAINTENANCE
 - COOLANT 4-4
 - FUEL 4-4
 - GUIDE TO 4-2
 - LUBRICANTS AND OPERATING MEANS 4-8
 - OIL 4-4
 - OUTLINES OF SERVICE 4-4
 - SCHEDULE CHART 4-15
 - MOVING MACHINE OFF 3-87
- N**
- NOISE EMISSION LEVELS 5-4
- O**
- OPERATING DATA 1-17
 - OPERATION 3-66
 - CHECKS AFTER COMPLETION OF 3-114
 - PRECAUTIONS FOR 3-107
 - OPTIONS 6-1
- P**
- PARKING MACHINE 3-112
 - PARTS
 - REPLACEMENT OF SAFETY CRITICAL 4-14
 - PEDALS 3-51
 - PRECAUTIONS
 - FOR MAINTENANCE 2-25
 - FOR OPERATION 2-13
 - BATTERY 2-22

INDEX

BEFORE STARTING ENGINE	2-13
OPERATION	2-14
TOWING	2-24
TRANSPORTATION	2-21
WITH TIRES	2-32

S

SAFETY	2-2
GENERAL PRECAUTIONS	2-5
INFORMATION	1-4
SAFETY BAR	3-60
SAFETY LABELS	2-3
EXPLANATION	2-4
LOCATION	2-3
SEMI AUTO DIGGING	3-103
SERIAL NO.	
TABLE	1-9
SERVICE MATER	
POSITION OF	1-9
SERVICE PROCEDURE	4-17
CHECK BEFORE STARTING	4-37
EVERY 100 HOURS SERVICE	4-39
EVERY 1000 HOURS SERVICE	4-50
EVERY 2000 HOURS SERVICE	4-52
EVERY 250 HOURS SERVICE	4-41
EVERY 4000 HOURS SERVICE	4-59
EVERY 50 HOURS SERVICE	4-38
EVERY 500 HOURS SERVICE	4-46
EVERY 8000 HOURS SERVICE	4-62
INITIAL 250 HOURS SERVICE	4-17
WHEN REQUIRED	4-18
SLOW-BLOW FUSE	3-64
STARTING ENGINE	3-81
STEERING TILT LOCK LEVER	3-57
STOPPING ENGINE	3-86, 3-87
SWITCHES	3-36

T

TAKING OFF POWER	3-64
TECHNICAL DATA	5-2
LIMIT VALUES FOR SLOPES	
MAXIMUM SLOPE ANGLE	5-5
TILT ANGLE	5-5
NOISE EMISSION LEVELS	5-4
VIBRATION LEVEL	5-4

TIRES

HANDLING	3-115
----------------	-------

TORQUES

BOLTS	4-13
LIST	4-13
NUTS	4-13

TOWING PIN	3-60
------------------	------

TRANSPORTATION	3-117
----------------------	-------

LOADING	3-117
PROCEDURE	3-117
UNLOADING WORK WITH TRAILERS	3-117

TROUBLESHOOTING	3-126
-----------------------	-------

IF BATTERY IS DISCHARGED	3-131
OTHER TROUBLE	3-134
TOWING THE MACHINE	3-127
WHEN MACHINE RUNS OUT OF FUEL	3-126

TURNING	3-96
---------------	------

V

VIBRATION LEVEL	5-4
-----------------------	-----

W

WEAR PARTS

LIST	4-7
REPLACEMENT	4-7

WEIGHTS	1-17
---------------	------

WHEEL LOADER OPERATIONS	3-100
-------------------------------	-------

DIGGING	3-100
LEVELING	3-104
LOAD AND CARRY	3-104
LOADING	3-102, 3-105
PUSHING	3-104
SEMI AUTO DIGGING	3-103

WORK EQUIPMENT

OPERATION OF	3-98
--------------------	------

NOTES

NOTES

FOREWORD

FOREWORD	1-2
SAFETY INFORMATION	1-4
INTRODUCTION	1-6
INTENDED USE	1-6
DIRECTIONS OF MACHINE	1-6
NECESSARY INFORMATION	1-7
MACHINE SERIAL NO. PLATE AND POSITION	1-7
ENGINE SERIAL NO. PLATE AND POSITION	1-7
ROPS/FOPS-CAB SERIAL NO. PLATE	1-8
AXLE SERIAL NO. PLATE	1-8
TRANSMISSION SERIAL NO. PLATE	1-8
SEAT OPERATOR SERIAL NO. PLATE	1-8
POSITION OF SERVICE METER	1-9
TABLE TO ENTER SERIAL NO. AND DISTRIBUTOR	1-9
CONTENTS	1-10
DIMENSIONS, WEIGHTS AND OPERATING DATA	1-17
WA470-5H: DIMENSIONS, WEIGHTS AND OPERATING DATA	1-17
CE-CONFORMING EQUIPMENT	1-18
CE-CONFORMING EQUIPMENT - PART 1	1-18
MANUFACTURER-SUPPLIED CE-CONFORMING EQUIPMENT, ACCORDING TO DOCUMENT 421-93- H1900	1-19

SAFETY

SAFETY LABELS	2-3
LOCATION OF SAFETY LABELS	2-3
SAFETY LABELS	2-4
GENERAL PRECAUTIONS	2-5
PRECAUTIONS FOR OPERATION	2-13
BEFORE STARTING ENGINE	2-13
OPERATION	2-14
TRANSPORTATION	2-21
BATTERY	2-22
TOWING	2-24
PRECAUTIONS FOR MAINTENANCE	2-25
PRECAUTIONS WITH TIRES	2-32

OPERATION

GENERAL VIEW	3-2
GENERAL VIEW OF MACHINE	3-2
GENERAL VIEW OF CONTROLS AND GAUGES	3-3
EXPLANATION OF COMPONENTS	3-6
MACHINE MONITOR	3-6
TYPES OF WARNING	3-7
CENTRAL WARNING LAMP	3-7
CHARACTER DISPLAY PORTION	3-8
EMERGENCY STOP ITEM	3-14
CAUTION ITEMS	3-17
INSPECTION AND MAINTENANCE ITEM	3-20
PILOT DISPLAY PORTION	3-24
METER DISPLAY PORTION	3-29
OTHER FUNCTIONS OF MACHINE MONITOR	3-31
SWITCHES	3-36
CONTROL LEVERS, PEDALS	3-51
STEERING TILT LOCK LEVER	3-57
CAP WITH LOCK	3-58
METHOD OF OPENING AND CLOSING CAP WITH LOCK (FOR THE FUEL TANK FILLER PORT)	3-58
METHOD OF OPENING AND CLOSING CAP WITH LOCK (FOR THE HYDRAURIC TANK FILLER PORT)	3-59
SAFETY BAR	3-60
TOWING PIN	3-60
GREASE PUMP	3-60
CAB DOOR OPEN LOCK	3-61
CAB WINDOW OPEN LOCK CANCEL KNOB	3-61
BACKUP ALARM	3-61
FUSE	3-62
FUSE CAPACITY AND NAME OF CIRCUIT	3-63
SLOW-BLOW FUSE	3-64
TAKING OFF POWER	3-64
HANDLING CAB WIPER	3-65
PREVENTING DAMAGE TO WIPER ARM BRACKET	3-65
DUST INDICATOR	3-65
OPERATION	3-66
CHECK BEFORE STARTING ENGINE, ADJUST	3-66
WALK-AROUND CHECK	3-66
CHECK BEFORE STARTING	3-69
ADJUSTMENT	3-74
OPERATIONS AND CHECKS BEFORE STARTING ENGINE	3-79
STARTING ENGINE	3-81
AUTOMATIC WARMING-UP OPERATION	3-83
OPERATIONS AND CHECKS AFTER STARTING ENGINE	3-84

BREAKING IN THE MACHINE	3-84
NORMAL OPERATION	3-84
STOPPING ENGINE.....	3-86
CHECK AFTER STOPPING ENGINE	3-86
MOVING MACHINE OFF (DIRECTIONAL, SPEED), STOPPING	3-87
PREPARATIONS FOR MOVING MACHINE.....	3-87
CHANGING GEAR SPEED	3-90
CHANGING DIRECTION.....	3-91
STOPPING MACHINE.....	3-93
TURNING.....	3-96
EMERGENCY STEERING	3-96
OPERATION OF WORK EQUIPMENT	3-98
WORK POSSIBLE USING WHEEL LOADER	3-100
DIGGING OPERATIONS.....	3-100
LEVELING OPERATIONS.....	3-104
PUSHING OPERATION	3-104
LOAD AND CARRY OPERATIONS	3-104
LOADING OPERATIONS	3-105
PRECAUTIONS FOR OPERATION	3-107
PERMISSIBLE WATER DEPTH.....	3-107
IF WHEEL BRAKE DOES NOT WORK.....	3-107
PRECAUTIONS WHEN DRIVING UP OR DOWN SLOPES.....	3-107
PRECAUTIONS REGARDING BRAKE FUNCTION	3-108
ADJUSTING WORK EQUIPMENT POSTURE.....	3-109
ADJUSTING BOOM KICKOUT	3-109
ADJUSTING BUCKET POSITIONER.....	3-111
BUCKET LEVEL INDICATOR	3-111
PARKING MACHINE	3-112
CHECKS AFTER COMPLETION OF OPERATION	3-114
LOCKING.....	3-114
HANDLING THE TIRES.....	3-115
PRECAUTIONS WHEN HANDLING TIRES.....	3-115
TIRE PRESSURE.....	3-115
PRECAUTIONS WHEN LOAD AND CARRY METHOD	3-116
TRANSPORTATION.....	3-117
TRANSPORTATION PROCEDURE	3-117
LOADING, UNLOADING WORK WITH TRAILERS	3-117
LOADING.....	3-117
SECURING MACHINE	3-118
UNLOADING	3-118
LIFTING MACHINE.....	3-119
POSITION FOR STICKING LIFTING POSITION MARK.....	3-120
WEIGHT TABLE	3-120
LIFTING PROCEDURE	3-121
COLD WEATHER OPERATION	3-122
PRECAUTIONS FOR LOW TEMPERATURE	3-122

FUEL AND LUBRICANTS	3-122
COOLANT	3-122
BATTERY	3-123
PRECAUTIONS AFTER COMPLETION OF WORK	3-123
AFTER COLD WEATHER	3-123
WARMING-UP OPERATION FOR STEERING HYDRAURIC CIRCUIT IN COLD WEATHER	3-124
LONG-TERM STORAGE	3-125
BEFORE STORAGE	3-125
DURING STORAGE	3-125
AFTER STORAGE	3-125
TROUBLESHOOTING	3-126
WHEN MACHINE RUNS OUT OF FUEL	3-126
TOWING THE MACHINE	3-127
WHEN ENGINE CAN BE USED	3-128
WHEN ENGINE CANNOT BE USED	3-128
RELEASING PARKING BRAKE	3-128
EMERGENCY TRAVEL OPERATION	3-130
IF BATTERY IS DISCHARGED	3-131
REMOVAL AND INSTALLATION OF BATTERY	3-131
PRECAUTIONS FOR CHARGING BATTERY	3-132
STARING ENGINE WITH BOOSTER CABLE	3-132
OTHER TROUBLE	3-134
ELECTRICAL SYSTEM	3-134
CHASSIS	3-135
ENGINE	3-137

MAINTENANCE

GUIDES TO MAINTENANCE	4-2
OUTLINES OF SERVICE	4-4
OUTLINE OF OIL, FUEL, COOLANT	4-4
OIL	4-4
FUEL	4-4
COOLANT	4-4
GREASE	4-5
CARRYING OUT KOWA (Komatsu Oil Wear Analysis)	4-5
STORING OIL AND FUEL	4-6
FILTERS	4-6
OUTLINE OF ELECTRIC SYSTEM	4-6
WEAR PARTS LIST	4-7
THE PARTS IN PARENTHESES ARE TO BE REPLACED AT THE SAME TIME	4-7
LUBRICANTS AND OPERATING MEANS	4-8
LUBRICATION CHART	4-8

LUBRICANTS, FUELS AND FILLING CAPACITIES	4-9
STANDARD TIGHTENING TORQUES FOR BOLTS AND NUTS	4-13
TORQUE LIST	4-13
PERIODIC REPLACEMENT OF SAFETY CRITICAL PARTS	4-14
MAINTENANCE SCHEDULE CHART	4-15
MAINTENANCE SCHEDULE CHART	4-15
SERVICE PROCEDURE	4-17
INITIAL 250 HOURS SERVICE	4-17
WHEN REQUIRED	4-18
CHECK, CLEAN, OR REPLACE AIR CLEANER ELEMENT	4-18
CLEAN INSIDE OF COOLING SYSTEM	4-21
CHECK TRANSMISSION OIL LEVEL, ADD OIL	4-24
CHECK AXLE OIL LEVEL, ADD OIL.....	4-25
CHECK AXLE CASE BREATHER.....	4-26
CLEAN CONDENSER OF AIR CONDENSER.....	4-26
CHECK WINDOW WASHING FLUID LEVEL, ADD FLUID.....	4-27
CLEAN RADIATOR FINS AND COOLER FINS	4-28
CHECK ELECTRICAL INTAKE AIR HEATER	4-31
REPLACE BOLT ON CUTTING EDGE	4-31
REPLACE BUCKET TEETH.....	4-32
CHECK AIR CONDITIONER	4-33
REPLACE SLOW BLOW FUSE	4-34
SELECTION AND INSPECTION OF TIRES	4-35
CHECK BEFORE STARTING	4-37
EVERY 50 HOURS SERVICE	4-38
DRAIN WATER, SEDIMENT FROM FUEL TANK.....	4-38
EVERY 100 HOURS SERVICE	4-39
CHECK OIL LEVEL IN HYDRAULIC TANK, ADD OIL.....	4-39
CLEAN ELEMENT IN AIR CONDITIONER FRESH AIR FILTER.....	4-40
EVERY 250 HOURS SERVICE	4-41
CHECK ENGINE ELECTROLYTE LEVEL	4-41
CHECK PARKING BRAKE.....	4-42
CHECK ALTERNATOR BELT TENSION, ADJUST	4-43
CHECK AIR CONDITIONER COMPRESSOR BELT TENSION, ADJUST	4-44
CHECK FOR LOOSE WHEEL HUB NUTS, TIGHTEN.....	4-44
CLEAN ELEMENT IN AIR CONDITIONER RECIRCULATION FILTER	4-45
EVERY 500 HOURS SERVICE	4-46
CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE	4-46
REPLACE FUEL FILTER CARTRIDGE	4-47
CLEAN FUEL STRAINER	4-49
EVERY 1000 HOURS SERVICE	4-50
CHANGE OIL IN TRANSMISSION CASE AND TRANSMISSION OIL FILTER CARTRIDGE, CLEAN STRAINER.....	4-50
CLEAN TRANSMISSION CASE BREATHER.....	4-51
CHECK TIGHTENING PARTS OF TURBOCHARGER	4-51

CHECK PLAY OF TURBOCHARGER ROTOR	4-51
REPLACE CORROSION RESISTOR CARTRIDGE	4-51
EVERY 2000 HOURS SERVICE	4-52
CHANGE OIL IN HYDRAULIC TANK, REPLACE HYDRAULIC FILTER ELEMENT	4-52
REPLACE HYDRAULIC TANK BREATHER ELEMENT	4-54
CHANGE AXLE OIL	4-55
REPLACE ELEMENT IN AIR CONDITIONER RECIRCULATION AIR FILTER, FRESH AIR FILTER	4-55
CLEAN PPC CIRCUIT STRAINER	4-56
CLEAN ENGINE BREATHER ELEMENT	4-56
CHEK ALTERNATOR, STARTING MOTOR	4-56
CHECK ENGINE VALVE CLEARANCE, ADJUST	4-56
CLEAN AND CHECK TURBOCHARGER	4-56
CHECK INJECTOR	4-57
CHECK ACCUMULATOR GAS PRESSURE	4-57
CHECK VIBRATION DAMPER	4-57
CHECK BRAKE DISC WEAR	4-58
EVERY 4000 HOURS SERVICE	4-59
LUBRICATING	4-59
CHECK WATER PUMP	4-59
CHECK AIR CONDITIONER COMPRESSOR, ADJUST	4-60
CHECK INJECTOR NOZZLE TIP	4-60
CHECKING FOR LOOSENESS OF HIGH-PRESSURE CLAMP, HARDENING OF RUBBER	4-60
CHECKING FOR MISSING FUEL SPRAY PREVENTION CAP, HARDENING OF RUBBER	4-61
EVERY 8000 HOURS SERVICE	4-62
REPLACE HIGH-PRESSURE PIPING CLAMP	4-62
REPLACE FUEL SPRAY PREVENTION CAP	4-62
CHECK INJECTOR NOZZLE TIP, REPLACE IF NECESSARY	4-62

TECHNICAL DATA

TECHNICAL DATA	5-2
NOISE EMISSION LEVELS	5-4
VIBRATION LEVEL	5-4
LIMIT VALUES FOR SLOPES	5-5

ATTACHMENTS, OPTIONS

HANDLING LOAD METER	6-2
GENERAL LOCATIONS	6-2
MACHINE MONITOR WITH LOAD METER	6-2
SWITCHES	6-3
LOAD METER FUNCTIONS	6-4
HANDLING LOAD METER DISPLAY	6-7

SETTING ADDITION MODE	6-7
SETTING REMAIN MODE	6-9
TOTAL LOAD DATA DISPLAY	6-12
STOPPING CALCULATION	6-14
CARRYING OUT CALIBRATION (ADJUSTING 0 POINT) WHEN EMPTY	6-15
CARRYING OUT CALIBRATION (ADJUSTING 0 POINT) WHEN LOADED	6-17
SUBTRACTION FUNCTION	6-20
METHOD OF SETTING TIME ON CLOCK	6-22
PRINTER OUTPUT	6-24
PRINTOUT MODE	6-24
METHOD OF SELECTING PRINTOUT MODE	6-25
HANDLING TORQUE CONVERTER LOCK-UP	6-27
GENERAL LOCATIONS	6-27
METHOD OF OPERATION	6-28
WARNING/LIMIT FUNCTIONS FOR TRAVEL SPEED	6-29
AIR CONDITIONER	6-30
GENERAL LOCATIONS AND FUNCTION OF CONTROL PANEL	6-30
METHOD OF OPERATION	6-33
PRECAUTIONS WHEN USING	6-34
HANDLING AUTOMATIC AIR-CONDITIONER	6-35
GENERAL LOCATIONS AND FUNCTIONS OF CONTROL PANEL	6-35
METHOD OF OPERATION	6-39
PRECAUTIONS WHEN USING	6-41
INSPECTION AND MAINTENANCE	6-41
CENTRAL LUBRICATION	6-42
OPERATION	6-42
DISPLAY AND CONTROL UNIT	6-43
LED-DISPLAY	6-43
PUSHBUTTONS	6-43
CHANGING THE LUBRICATION INTERVAL TIMES	6-44
HANDLING JOYSTICK STEERING SYSTEM	6-45
EXPLANATION OF COMPONENTS	6-45
SHIFT UP, SHIFT DOWN SWITCHES	6-45
FNR SWITCH	6-46
JOYSTICK STEERING LEVER	6-46
JOYSTICK ON/OFF SWITCH	6-46
HI/LOW SELECTOR SWITCH	6-46
HORN SWITCH	6-47
CONSOLE LOCK LEVER	6-47
HEIGHT ADJUSTMENT LOCK LEVER	6-47
ANGLE, FORE/AFT ADJUSTMENT LOCK LEVER	6-47
STRUCTURE AND FUNCTION OF JOYSTICK STEERING	6-47
GETTING IN OR OUT OF OPERATOR'S CAB	6-49
ADJUSTMENT OF JOYSTICK CONSOLE	6-49

OPERATION METHOD OF JOYSTICK STEERING SYSTEM	6-50
INDEX	7-1
 NOTES	
NOTES	8-2

