

Operation & Maintenance Manual

SEAM044602T

PC78US-6

HYDRAULIC EXCAVATOR

SERIAL NUMBERS 5501 and up

WARNING

Unsafe use of this machine may cause serious injury or death. Operators and maintenance personnel must read this manual before operating or maintaining this machine. This manual should be kept near the machine for reference and periodically reviewed by all personnel who will come into contact with it.

NOTICE

Komatsu has Operation & Maintenance Manuals written in some other languages. If a foreign language manual is necessary, contact your local distributor for availability.

KOMATSU

FOREWORD

CALIFORNIA

Proposition 65 Warning

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

CALIFORNIA

Proposition 65 Warning

Battery posts, terminals and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and birth defects or other reproductive harm.

Wash hands after handling.

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.

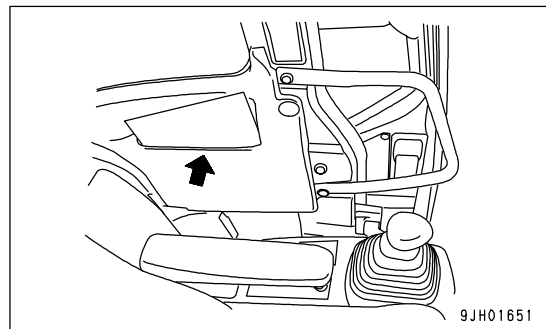
Keep this manual at the storage location for the Operation and Maintenance Manual given below, and have all personnel read it periodically.

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:
A magazine box provided on the left side of operator's seat



EMISSION CONTROL WARRANTY

EMISSION CONTROL WARRANTY STATEMENT (APPLIES TO CANADA ONLY)

1. **Products Warranted**

Komatsu America International Company, Komatsu Mining Systems Inc. and Komatsu Utility Corporation (collectively "Komatsu") produce and/or market products under brand names of Komatsu, Dresser, Dressta, Haulpak and Galion. This emissions warranty applies to new engines bearing the Komatsu name installed in these products and used in Canada in machines designed for industrial off-highway use. This warranty applies only to these engines produced on or after January 1, 2000. This warranty will be administered by Komatsu distribution in Canada.

2. **Coverage**

Komatsu warrants to the ultimate purchaser and each subsequent purchaser that the engine is designed, built and equipped so as to conform, at the time of sale by Komatsu, with all U.S. Federal emission regulations applicable at the time of manufacture and that it is free from defects in workmanship or material which would cause it not to meet these regulations within five years or 3,000 hours of operation, whichever occurs first, as measured from the date of delivery of the engine to the ultimate purchaser.

3. **Limitations**

Failures, other than those resulting from defects in materials or workmanship, are not covered by this warranty. Komatsu is not responsible for failures or damage resulting from what Komatsu determines to be abuse or neglect, including, but not limited to: operation without adequate coolant or lubricants; over fueling; over speeding; lack of maintenance of lubricating, cooling or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications of the engine. Komatsu is also not responsible for failures caused by incorrect fuel or by water, dirt or other contaminants in the fuel. Komatsu is not responsible for non-engine repairs, "downtime" expense, related damage, fines, all business costs or other losses resulting from a warrantable failure.

KOMATSU IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

This warranty, together with the express commercial warranties, are the sole warranties of Komatsu. **THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.**

GARANTIE SUR LE CONTRÔLE DES ÉMISSIONS

ÉNONCÉ DE GARANTIE SUR LE CONTRÔLE DES ÉMISSIONS (APPLICABLE AU CANADA SEULEMENT):

1. **Produits garantis:**

Komatsu America International Company, Komatsu Mining Systems Inc. et Komatsu Utility Corporation (collectivement Komatsu) produisent et/ou font la mise en marché de produits portant les noms de marque Komatsu, Dresser, Dressta, Haulpak et Galion. Cette garantie sur les émissions s'applique à tous les nouveaux moteurs portant le nom Komatsu, installés dans ces produits et utilisés au Canada dans des machines conçues pour utilisation industrielle non-rouitière. Cette garantie s'applique seulement sur les moteurs produits à partir du 1er Janvier 2000. Cette garantie sera administrée par la distribution de Komatsu au Canada.

2. **Couverture:**

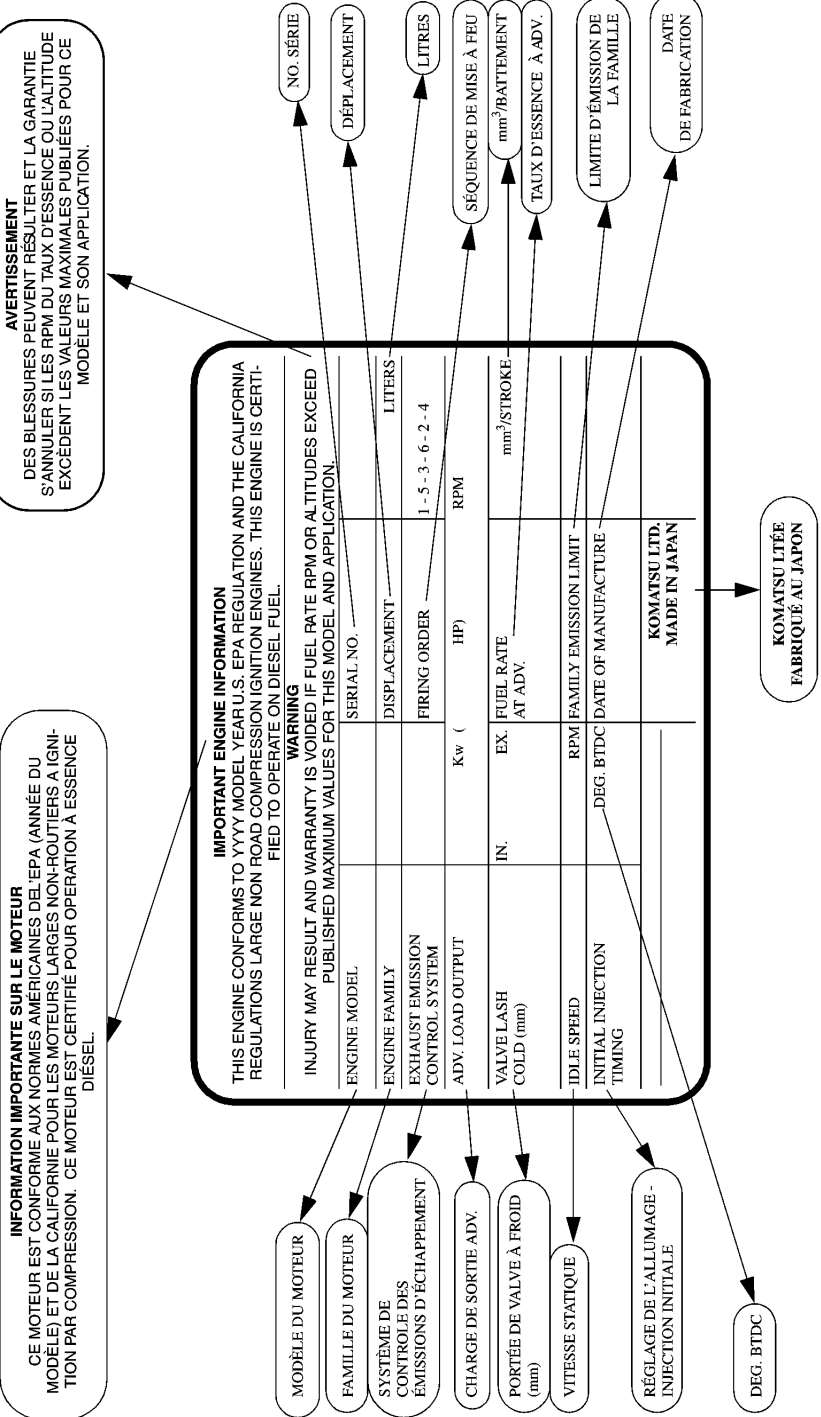
Komatsu garantit à l'acheteur ultime et chaque acheteur subséquent que le moteur est conçu, construit et équipé en toute conformité, au moment de la vente par Komatsu, avec toutes les Réglementations fédérales américaines sur les émissions applicables au moment de la fabrication et qu'il est exempt de défauts de construction ou de matériaux qui auraient pour effet de contrevenir à ces réglementations en dedans de 5 ans ou 3000 heures d'opération, mesuré à partir de la date de livraison du moteur au client ultime.

3. **Limitations:**

Les bris, autres que ceux résultant de défauts de matériaux ou de construction, ne sont pas couverts par cette Garantie. Komatsu n'est pas responsable pour bris ou dommages résultant de ce que Komatsu détermine comme étant de l'abus ou négligence, incluant mais ne se limitant pas à: l'opération sans lubrifiants ou agent refroidissants adéquats; la suralimentation d'essence; la survitesse; le manque d'entretien des systèmes de lubrification, de refroidissement ou d'entrée; de pratiques non-propices d'entreposage, de mise en marche, de réchauffement, de conditionnement ou d'arrêt; les modifications non-autorisées du moteur. De plus, Komatsu n'est pas responsable de bris causés par de l'essence inadéquate ou de l'eau, des saletés ou autres contaminants dans l'essence. Komatsu n'est pas responsable des réparations non-relées au moteur, des dépenses encourues suite aux temps d'arrêts, des dommages relatifs, amendes, et de tout autre coût d'affaires ou autres pertes résultant d'un bris couvert par la garantie.

KOMATSU N'EST PAS RESPONSABLE DES INCIDENTS OU DOMMAGES CONSÉQUENTS.

Cette garantie, ainsi que les garanties expresses commerciales, sont les seules garanties de Komatsu. **IL N'Y A AUCUNE AUTRE GARANTIE, EXPRESSE OU SOUS-ENTENDUE, MARCHANDABLE OU PROPICE A UNE UTILISATION PARTICULIÈRE.**



ENGINE DATAPLATE - ENGLISH / FRENCH




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. |
|  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. This word is used also to alert against unsafe practices that may cause property damage. |

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 control levers when they are not locked, this may cause a serious injury or death.

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.
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• 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 words" and "Safety labels using pictograms" to indicate safety procedures.

Example of safety label using words



Part No.

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.



Part No.

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))

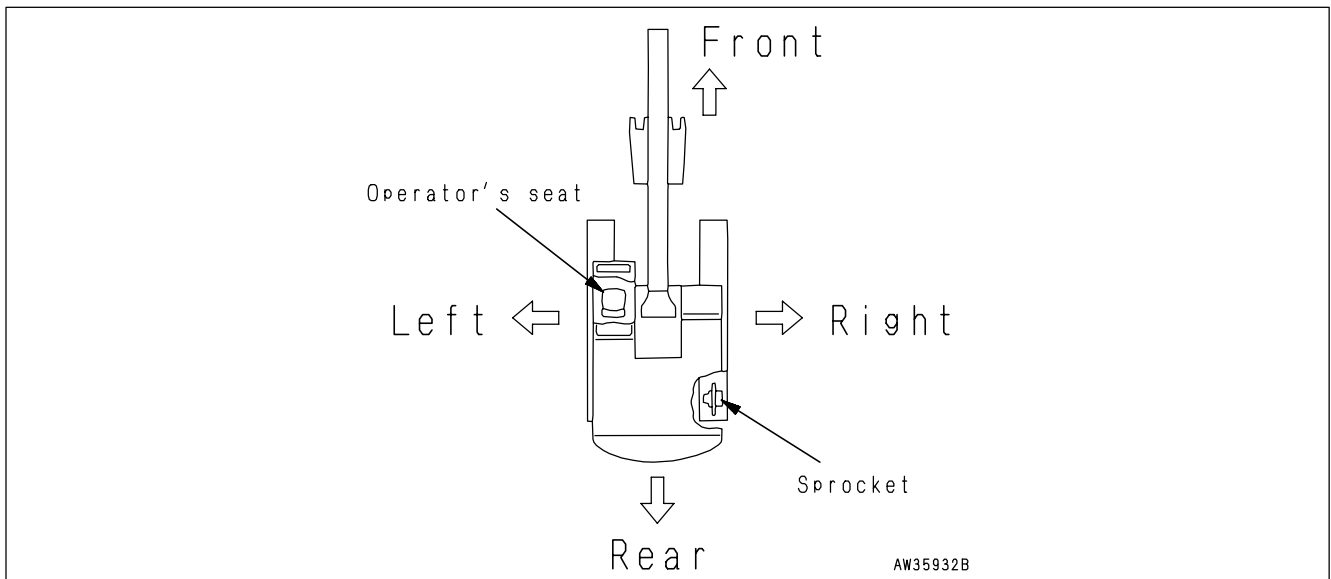
INTRODUCTION

This Komatsu machine is designed to be used mainly for the following work:

- Digging work
- Leveling work
- Ditching work
- Loading work
- Demolition work

See the section "RECOMMENDED APPLICATIONS (PAGE 3-97)" for further details.

DIRECTIONS OF MACHINE



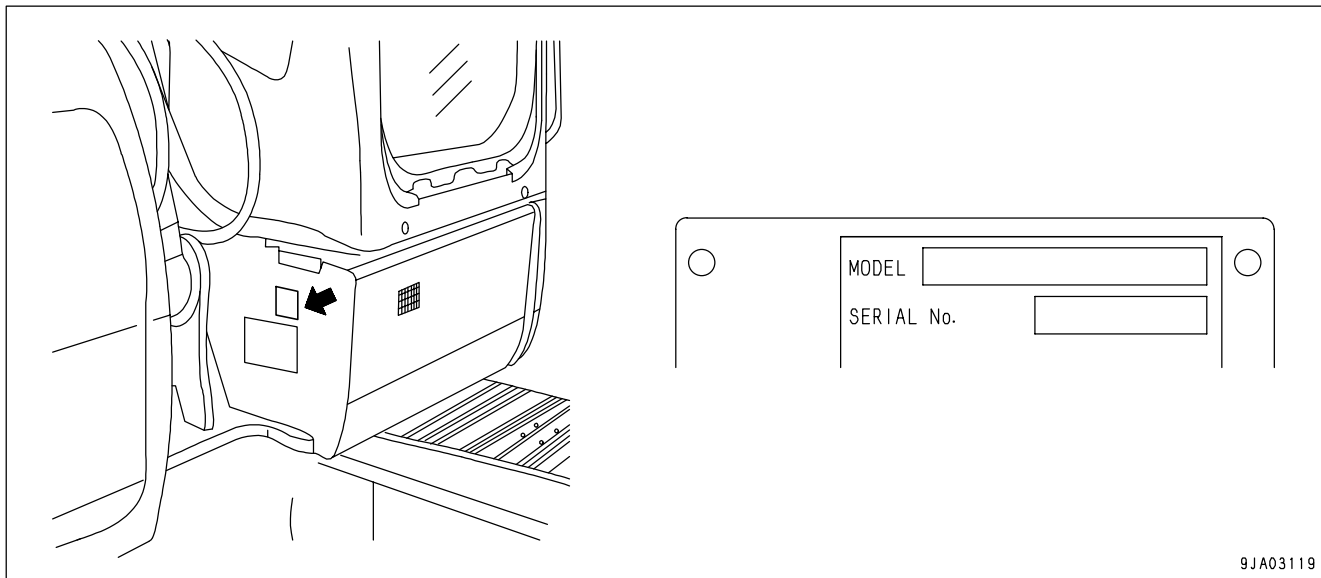
In this manual, the terms front, rear, left, and right refer to the travel direction as seen from the operator's seat when the operator's seat is facing the front and the sprocket is at the rear of the machine.

PRODUCT INFORMATION

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

MACHINE SERIAL NUMBER PLATE AND ITS LOCATION

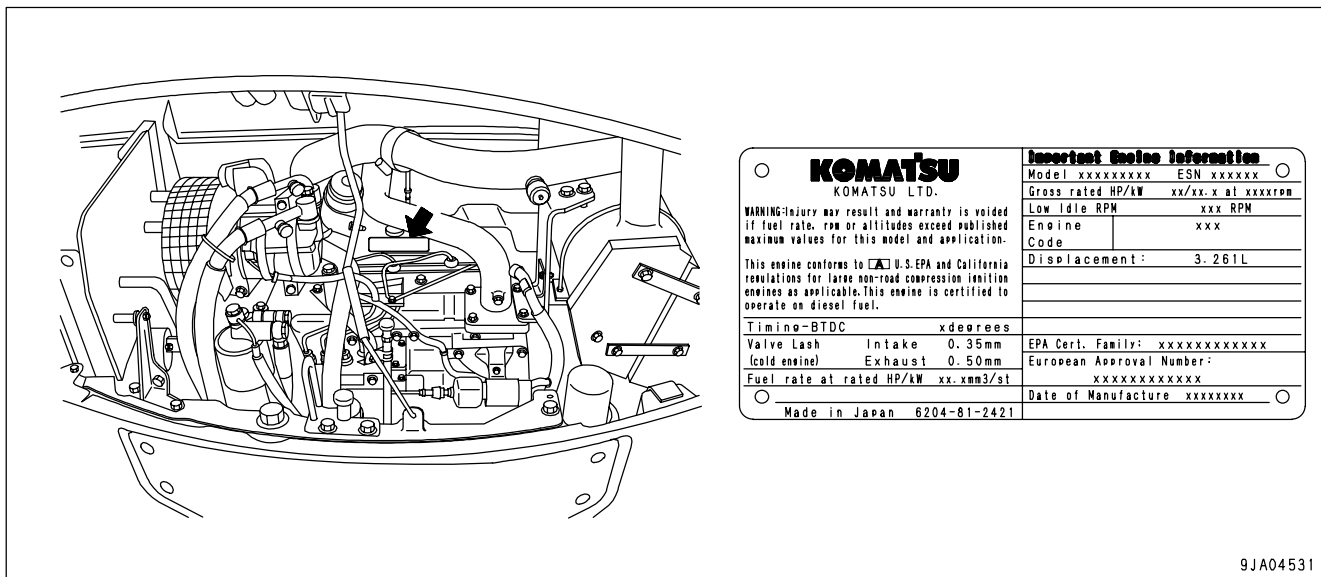
On the bottom right of the operator's cab



9JA03119

ENGINE SERIAL NUMBER PLATE AND ITS LOCATION

On the upper side of the engine cylinder head cover

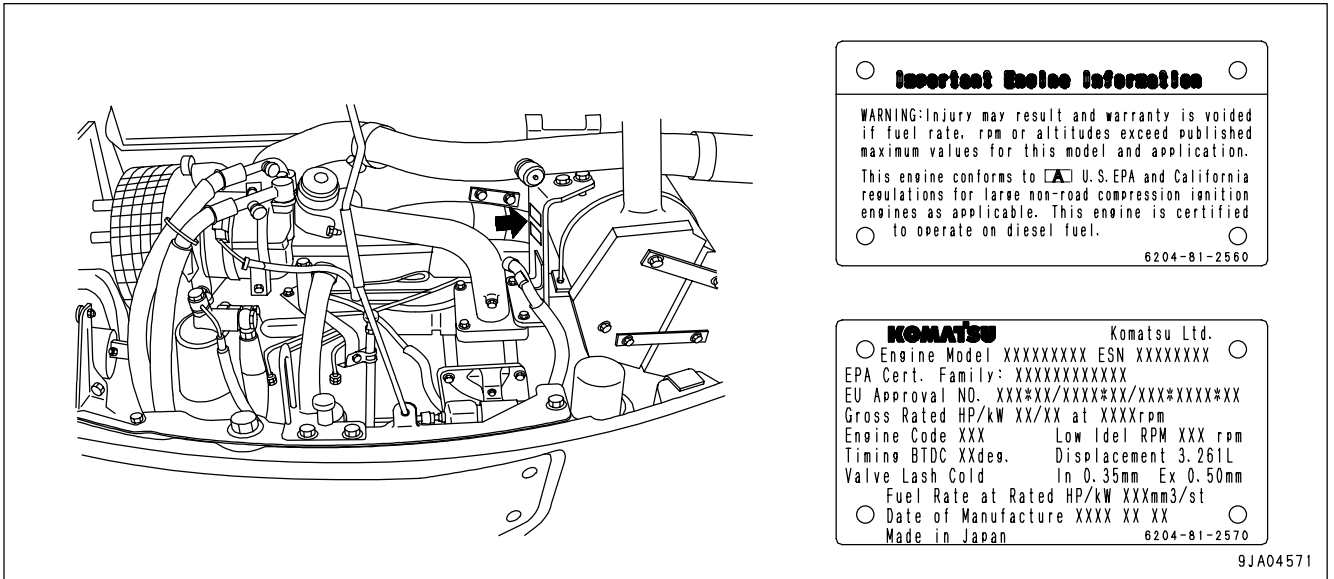


9JA04531

KOMATSU KOMATSU LTD.		Important Engine Information	
Model xxxxxxxx		ESN xxxxxx	
Gross rated HP/kW		xx/xx.x at xxxrpm	
Low Idle RPM		xxx RPM	
Engine Code		xxx	
Displacement :		3.261L	
Timing-BTDC		x degrees	
Valve Lash (cold engine)	Intake	0.35mm	EPA Cert. Family: xxxxxxxxxxxx
	Exhaust	0.50mm	European Approval Number:
Fuel rate at rated HP/kW	xx.xmm3/st	xxxxxxxxxxxx	Date of Manufacture xxxxxxxx
Made in Japan 6204-81-2421			

EMISSION CONTROL INFORMATION LABEL AND ITS LOCATION

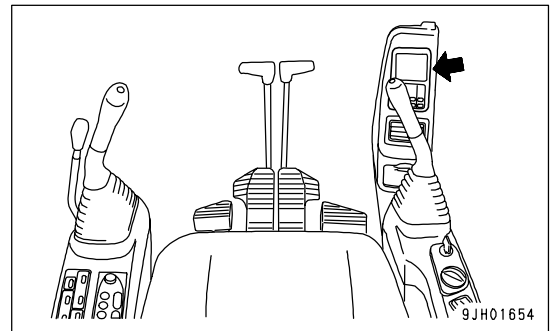
This is on the side face of the intake air mount bracket.



EPA: Environmental Protection Agency, U.S.A.

SERVICE METER LOCATION

On top of the machine monitor



YOUR MACHINE SERIAL NUMBERS AND DISTRIBUTOR

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

CONTENTS

FOREWORD ----- 1- 1

 FOREWORD ----- 1- 2

 SAFETY INFORMATION ----- 1- 5

 INTRODUCTION ----- 1- 7

 DIRECTIONS OF MACHINE ----- 1- 7

 PRODUCT INFORMATION ----- 1- 8

 MACHINE SERIAL NUMBER PLATE AND ITS LOCATION ----- 1- 8

 ENGINE SERIAL NUMBER PLATE AND ITS LOCATION ----- 1- 8

 EMISSION CONTROL INFORMATION LABEL AND ITS LOCATION ----- 1- 9

 SERVICE METER LOCATION ----- 1- 9

 YOUR MACHINE SERIAL NUMBERS AND DISTRIBUTOR ----- 1- 10

SAFETY ----- 2- 1

 SAFETY INFORMATION ----- 2- 2

 SAFETY LABELS ----- 2- 4

 LOCATION OF SAFETY LABELS ----- 2- 5

 SAFETY LABELS ----- 2- 6

 SAFETY INFORMATION ----- 2- 12

 SAFETY MACHINE OPERATION ----- 2- 20

 STARTING ENGINE ----- 2- 20

 OPERATION ----- 2- 22

 TRANSPORTATION ----- 2- 28

 BATTERY ----- 2- 29

 TOWING ----- 2- 31

 LIFTING OBJECTS WITH BUCKET ----- 2- 32

 SAFETY MAINTENANCE INFORMATION ----- 2- 33

OPERATION ----- 3- 1

 MACHINE VIEW ILLUSTRATIONS ----- 3- 2

 OVERALL MACHINE VIEW ----- 3- 2

 CONTROLS AND GAUGES ----- 3- 3

 DETAILED CONTROLS AND GAUGES ----- 3- 4

 MONITORING SYSTEM ----- 3- 4

 SWITCHES ----- 3- 15

 CONTROL LEVERS AND PEDALS ----- 3- 20

 SUN ROOF ----- 3- 24

 WINDSHIELD ----- 3- 25

 SLIDING DOOR ----- 3- 30

 EMERGENCY ESCAPE HAMMER ----- 3- 30

 CAP WITH LOCK ----- 3- 32

 ENGINE HOOD ----- 3- 33

 MUD COVER ----- 3- 34

 BATTERY INSPECTION COVER ----- 3- 35

 FUSE ----- 3- 36

 FUSIBLELINK ----- 3- 37

 AUXILIARY ELECTRIC POWER ----- 3- 37

 CONTROLLERS ----- 3- 37

 HEATER AND DEFROSTAR CONTROLS ----- 3- 38

 AIR CONDITIONER CONTROLS ----- 3- 43

 RADIO ----- 3- 49

OPERATION MANUAL STORAGE	3- 54
TOOL BOX	3- 54
GREASE PUMP HOLDER	3- 54
ASHTRAY	3- 54
FIRE EXTINGUISHER	3- 55
MACHINE OPERATIONS AND CONTROLS	3- 56
BEFORE STARTING ENGINE	3- 56
STARTING ENGINE	3- 72
AFTER STARTING ENGINE	3- 77
STOPPING THE ENGINE	3- 80
CHECK AFTER SHUT OFF ENGINE	3- 80
MACHINE OPERATION	3- 81
STEERING THE MACHINE	3- 85
SWINGING	3- 87
WORK EQUIPMENT CONTROLS AND OPERATIONS	3- 88
WORKING MODE	3- 89
PROHIBITED OPERATIONS	3- 90
GENERAL OPERATION INFORMATION	3- 92
TRAVELING ON SLOPES	3- 94
ESCAPE FROM MUD	3- 96
RECOMMENDED APPLICATIONS	3- 97
BUCKET REPLACEMENT AND INVERSION	3- 99
PARKING MACHINE	3-101
MACHINE INSPECTION AFTER DAILY WORK	3-102
LOCKING	3-102
ROAD LINERS AND RUBBER SHOES	3-103
TRANSPORTATION	3-108
TRANSPORTATION PROCEDURE	3-108
LOADING AND UNLOADING WITH TRAILER	3-108
LIFTING MACHINE	3-114
COLD WEATHER OPERATION	3-116
COLD WEATHER OPERATION INFORMATION	3-116
AFTER DAILY WORK COMPLETION	3-118
AFTER COLD WEATHER SEASON	3-118
LONG TERM STORAGE	3-119
BEFORE STORAGE	3-119
DURING STORAGE	3-119
AFTER STORAGE	3-119
TROUBLES AND ACTIONS	3-120
RUNNING OUT OF FUEL	3-120
PHENOMENA THAT ARE NOT FAILURES	3-120
TOWING THE MACHINE	3-120
SEVERE JOB CONDITION	3-121
DISCHARGED BATTERY	3-122
HOW TO LOWER WORK EQUIPMENT WHEN ENGINE STOPS DUE TO ABNORMALITY	3-127
OTHER TROUBLE	3-128
MAINTENANCE	4- 1
MAINTENANCE INFORMATION	4- 2
LUBRICANTS, COOLANT AND FILTERS	4- 4
HANDLING OIL, FUEL, COOLANT, AND PERFORMING OIL CLINIC	4- 4

ELECTRIC SYSTEM MAINTENANCE -----	4- 6
WEAR PARTS -----	4- 7
WEAR PARTS LIST -----	4- 7
LUBRICANTS, FUEL AND COOLANT SPECIFICATIONS -----	4- 8
PROPER SELECTION -----	4- 8
TIGHTENING TORQUE SPECIFICATIONS -----	4- 12
TIGHTENING TORQUE LIST -----	4- 12
SAFETY CRITICAL PARTS -----	4- 13
SAFETY CRITICAL PARTS LIST -----	4- 13
MAINTENANCE SCHEDULE -----	4- 14
MAINTENANCE SCHEDULE CHART -----	4- 14
MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER -----	4- 15
MAINTENANCE PROCEDURE -----	4- 16
INITIAL 250 HOURS MAINTENANCE (ONLY AFTER THE FIRST 250 HOURS) -----	4- 16
WHEN REQUIRED -----	4- 17
CHECK BEFORE STARTING -----	4- 48
EVERY 50 HOURS MAINTENANCE -----	4- 49
EVERY 100 HOURS MAINTENANCE -----	4- 50
EVERY 250 HOURS MAINTENANCE -----	4- 51
EVERY 500 HOURS MAINTENANCE -----	4- 59
EVERY 1000 HOURS MAINTENANCE -----	4- 66
EVERY 2000 HOURS MAINTENANCE -----	4- 70
EVERY 4000 HOURS MAINTENANCE -----	4- 71
EVERY 5000 HOURS MAINTENANCE -----	4- 72
SPECIFICATIONS -----	5- 1
SPECIFICATIONS -----	5- 2
ATTACHMENTS AND OPTIONS -----	6- 1
ATTACHMENTS AND OPTIONS - GENERAL INFORAMTION -----	6- 2
SAFETY FIRST -----	6- 2
ATTACHMENT INSTALLATION -----	6- 3
BUCKET WITH HOOK -----	6- 4
HOOK CONDITION -----	6- 4
PROHIBITED OPERATIONS -----	6- 4
MACHINE READY FOR ATTACHMENT -----	6- 5
LOCATIONS -----	6- 5
HYDRAULIC CIRCUIT -----	6- 7
ATTACHMENT OPERATIONS -----	6- 8
LONG TERM STORAGE -----	6- 10
SPECIFICATIONS -----	6- 10
METHOD FOR REMOVING AND INSTALLING EXTRA COUNTERWEIGHT -----	6- 11
CHANGING MACHINE CONTROL PATTERN (IF PATTERN CHANGE VALVE EQUIPPED) -----	6- 13
CONTROL PATTERN CHANGE PROCEDURE -----	6- 13
MACHINE CONTROL PATTERNS -----	6- 14
ATTACHMENT GUIDE -----	6- 15
OTHER ATTACHMENTS -----	6- 15
ATTACHMENT COMBINATIONS -----	6- 16
RECOMMENDED ATTACHMENT OPERATIONS -----	6- 17
HYDRAULIC BREAKER -----	6- 17
INDEX -----	7- 1

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 INFORMATION

SAFETY LABELS	2- 4
LOCATION OF SAFETY LABELS	2- 5
SAFETY LABELS	2- 6
SAFETY INFORMATION	
Safety rules	2- 12
If abnormalities are found	2- 12
Working wear and personal protective items	2- 12
Fire extinguisher and first aid kit	2- 12
Safety equipment	2- 12
Keep machine clean	2- 13
Keep operator's compartment clean	2- 13
Leaving operator's seat with lock	2- 13
Handrails and steps	2- 14
Mounting and dismounting	2- 14
No persons on attachments	2- 14
Do not get caught in articulated portion	2- 14
Burn prevention	2- 15
Fire prevention and explosion prevention	2- 15
Action if fire occurs	2- 16
Windshield Washer Fluid	2- 16
Falling objects, flying objects and intruding objects prevention	2- 16
Attachment installation	2- 17
Attachment combinations	2- 17
Cab widow glasses	2- 17
Unauthorized modifications	2- 17
Safety at jobsite	2- 17
Working on loose ground	2- 17
Distance to high voltage cables	2- 18
Ensure good visibility	2- 18
Ventilation for enclosed area	2- 19
Signalman's signal and signs	2- 19
Emergency exit from operator's cab	2- 19
Asbestos dust hazard prevention	2- 19

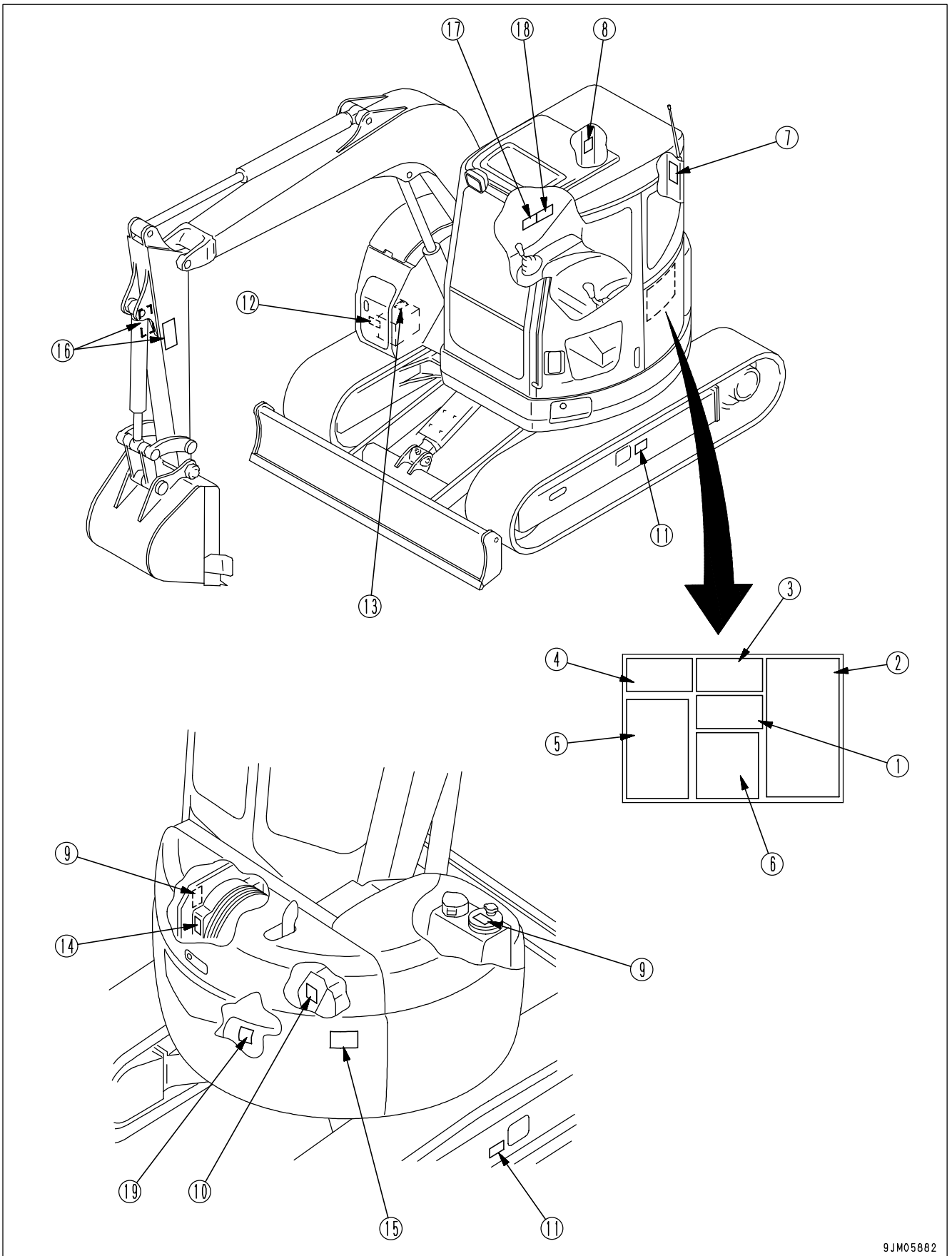
SAFETY MACHINE OPERATION	2- 20
STARTING ENGINE	2- 20
Checks before starting engine	2- 20
Safety rules for starting engine	2- 21
Starting engine in cold weather	2- 21
OPERATION	2- 22
Checks before operation	2- 22
Safety rules for changing machine directions	2- 22
Safety rules for traveling	2- 23
Traveling on slopes	2- 24
Operations on slopes	2- 25
Prohibited operations	2- 25
Operations on snow	2- 26
Parking machine	2- 27
TRANSPORTATION	2- 28
Loading and unloading	2- 28
Shipping the machine	2- 28
BATTERY	2- 29
Battery hazard prevention	2- 29
Starting engine with booster cables	2- 30
TOWING	2- 31
Safety rules for towing	2- 31
LIFTING OBJECTS WITH BUCKET	2- 32
Safety rules for lifting objects	2- 32
SAFETY MAINTENANCE INFORMATION	2- 33
Warning Tag	2- 33
Keep Work Place Clean and Tidy	2- 33
Appoint Leader when Working with Others	2- 33
Stop Engine Before Carrying Out Maintenance	2- 33
Two Workers for Maintenance when Engine is Running	2- 34
Proper Tools	2- 35
Personnel	2- 35
Attachments	2- 35
Work Under the Machine	2- 35
Noise	2- 35
When Using Hammer	2- 36
Welding Works	2- 36
Removing Battery Terminals	2- 36
Safety First when Using High-pressure Grease to Adjust Track Tension	2- 36
Do Not Disassemble Recoil Springs	2- 36
Safety Rules for High-pressure Oil	2- 37
Safety Handling High-pressure Hoses	2- 37
Waste Materials	2- 37
Air Conditioner Maintenance	2- 37
Compressed Air	2- 38
Periodic Replacement of Safety Critical Parts	2- 38

SAFETY LABELS

The following warning signs and safety labels are used on this machine.

- Be sure that you fully understand the correct position and content of labels.
- To ensure that the content of labels can be read properly, be sure that they are in the correct place and always keep them clean. When cleaning them, do not use organic solvents or gasoline. These may cause the labels to peel off.
- There are also other labels in addition to the warning signs and safety labels. Handle those labels in the same way.
- If the labels are damaged, lost, or cannot be read properly, replace them with new ones. For details of the part numbers for the labels, see this manual or the actual label, and place an order with Komatsu distributor.

LOCATION OF SAFETY LABELS



SAFETY LABELS

(1) Precautions for operation, inspection and maintenance (09651-03001)

⚠ WARNING

Improper operation and maintenance can cause serious injury or death.

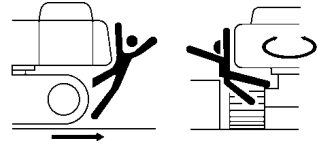
Read manual and labels before operation and maintenance. Follow instructions and warnings in manual and in labels on machine.

Keep manual in machine cab near operator.
Contact Komatsu distributor for a replacement manual.

09651-03001

(2) Precautions for before operation (09802-03000)

⚠ WARNING



To prevent SEVERE INJURY or DEATH, do the following before moving machine or its attachments:

- Honk horn to alert people nearby.
- Be sure no one is on or near machine or in swing area.
- Rotate cab for full view of travel path if it can be done safely.
- Use spotter if view is obstructed.

Follow above even if machine is equipped with travel alarm and mirrors.

09802-03000

(3) Warning for leaving operator's seat (09654-03001)

⚠ WARNING

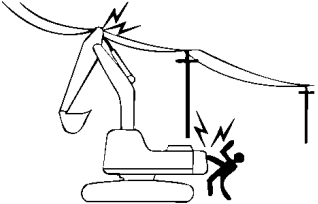
To avoid hitting unlocked operation levers, lower equipment to ground and move SAFETY LOCK LEVER (located near seat) to LOCK position before dtanding up from operator's seat.

Sudden and unwanted machine movement can cause serious injury or death.

09654-03001

(4) Warnings for high voltage (09801-03001)

⚠ DANGER




Hazardous voltage hazard. Serious injury or death can occur if machine or attachments are not kept safe distance away from electric lines.

VOLTAGE		SAFE DISTANCE
LOW VOLTAGE	100V 200V	2m
	6,600V	2m
	22,000V	3m
SPECIAL HIGH VOLTAGE	66,000V	4m
	154,000V	5m
	187,000V	6m
	275,000V	7m
	500,000V	11m

09801-03001

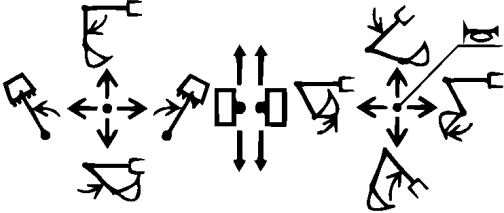
- (5) Precautions for operating pattern
Standard machine (09822-03000)



WARNING


In order to prevent an accident resulting in injury or death caused by error-operation, confirm the machine motion and indicated operating pattern, when operating machines. Pay attention to the circumference and operate slowly when confirming the machine motion.

ISO pattern



09822-03000

- (6) Precautions for operating pattern (if equipped)
Machine equipped with operating pattern selector valve (21W-98-44220)



WARNING

This machine is equipped with a control pattern selector valve. To prevent personal injury caused by mistaken operation, always check that the movement of the machine matches the pattern shown on the control pattern card before starting operations.

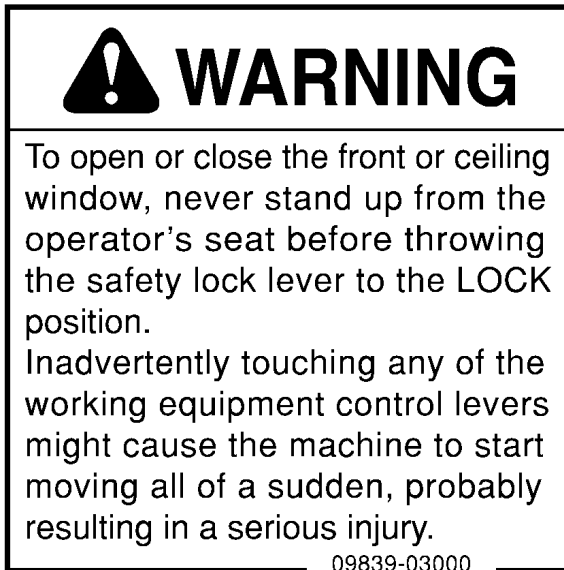
- When checking the movement of the machine, check that the surrounding area is safe and operate the machine slowly.
- If the movement does not match the control pattern card, replace the card with the card showing the correct control pattern.

Always do as follows when changing the control pattern.

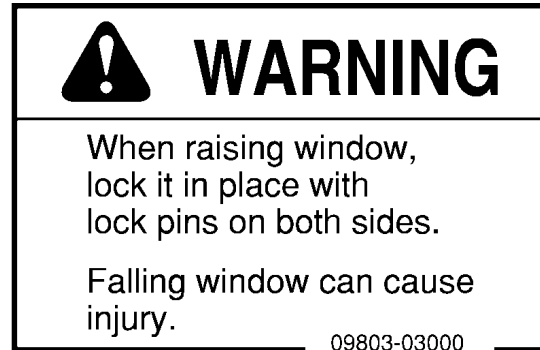
- Lower the work equipment to the ground, stop the engine, and set the safety lock lever to the LOCK position. Then change the control pattern.

21W-98-44220

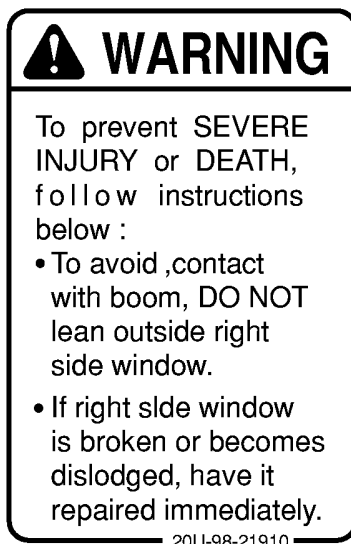
- (7) Precautions for opening the window
(09839-03000)



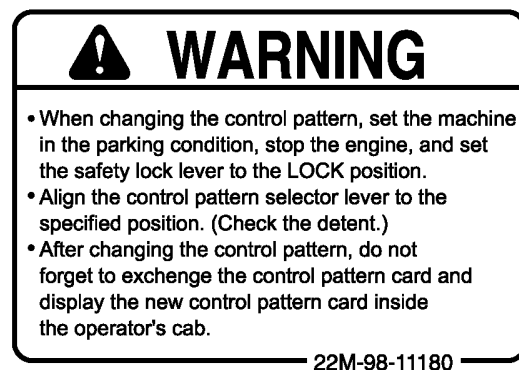
- (8) Precautions for stowage (09803-03000)



- (9) Precautions for broken or becomes dislodged to the window (20U-98-21910)



- (10) Precautions when switching operating pattern (22M-98-11180)
(machines equipped with operating pattern selector valve)



(11) Precautions for high-temperature cooling water
(14X-98-11531)



(12) Precautions for high-temperature hydraulic oil
(09653-03001)



(13) Precautions for high-temperature parts
(09817-A0753)




Sign indicates a burn hazard from touching heated parts, such as engine, motor, or muffler during or right after operation.

Never touch when hot.


(14) Precautions for check and adjust track tension
(09657-03003)



(15) Precautions for handling electric wires
(09808-03000)

 WARNING
<p>Improper use of booster cables and battery cables can cause an explosion resulting in serious injury or death.</p> <ul style="list-style-type: none"> • Follow instructions in manual when using booster cable and battery cables.
09808-03000


(16) Precautions for opening engine hood
(09667-03001)

 CAUTION
<p>While engine is running:</p> <ol style="list-style-type: none"> 1. Do not open cover. 2. Keep away from fan and fan-belt.
09667-03001

(17) Prohibited to enter range of swing (09133-23000)



(18) Precautions when handling battery
(09664-30082)

 WARNING
<p>EXPLOSIVE GASES Cigarettes, flames or sparks could cause battery to explode. Always shield eyes and face from battery. DO not charge or use booster cables or adjust post connections without proper instruction and training. KEEP VENT CAPS TIGHT AND LEVEL</p> <p>POISON causes severe burns Contains sulfuric acid. Avoid contact with skin, eyes or clothing. In event of accident flush with water and call a physician immediately. KEEP OUT OF REACH OF CHILDREN</p>
09664-30082

(19) Jump start prohibited (09842-A0481)



Start the engine only after sitting down in the operator's seat.

Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.

The safety labels, (1) through (5) and (7), are a single seal. In replacement, place an order for it with Part No. 22U-00-21290.

SAFETY INFORMATION

SAFETY RULES

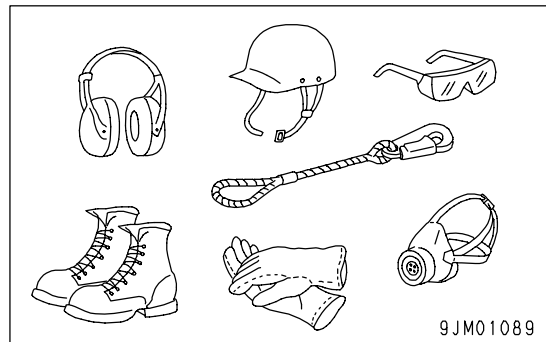
- Only trained and authorized personnel can operate and maintain the machine.
- Follow all safety rules, precautions and instructions when operating or performing maintenance on the machine.
- If you are under the influence of alcohol or medication, your ability to safely operate or repair your machine 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.

WORKING WEAR AND PERSONAL PROTECTIVE ITEMS

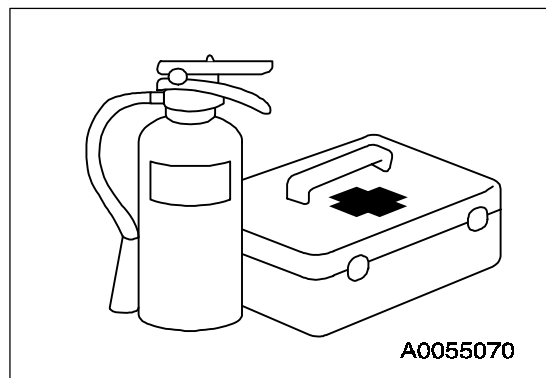
- Do not wear loose clothing and accessories. There is a hazard that they may catch on control levers or other protruding parts.
- If you have long hair and it hangs out from your hard hat, there is a hazard that it may get caught up in the machine, so tie your hair up and be careful not to let it get 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.

- Be sure that fire extinguishers have been provided and read the labels to ensure that you know how to use them in emergencies.
- Carry out periodic inspection and maintenance to ensure that the fire extinguisher can always be used.
- Provide a first aid kit at the storage point. Carry out periodic checks and add to the contents if necessary.

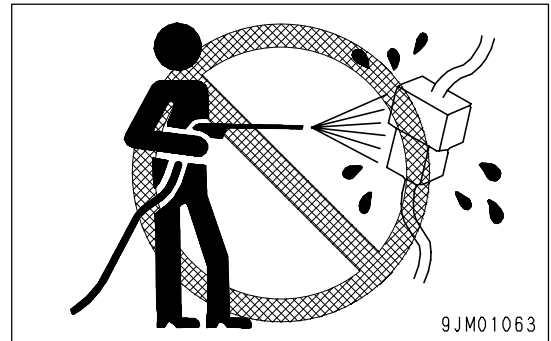


SAFETY EQUIPMENT

- 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

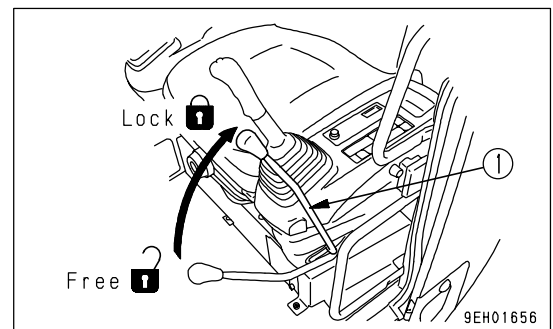
- If water gets into the electrical system, there is a hazard that it will cause malfunctions or misoperation. Do not use water or steam to wash the electrical system (sensors, connectors).
- If inspection and maintenance is carried out when the machine is still dirty with mud or oil, there is a hazard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

**KEEP OPERATOR'S COMPARTMENT CLEAN**

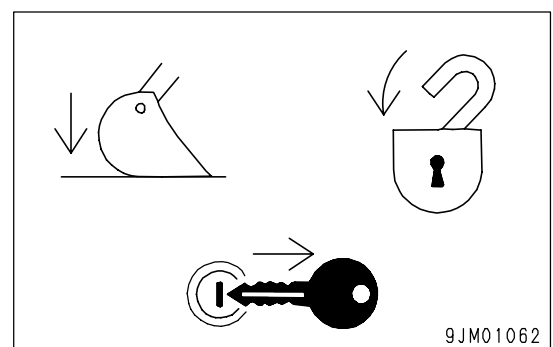
- When entering the operator's compartment, always remove all mud and oil from the soles of your shoes. If you operate the pedal with mud or oil affixed to your shoes, your foot may slip and this may cause a serious accident.
- Do not leave parts or tools lying around the operator's compartment.
- Do 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 compartment.

LEAVING OPERATOR'S SEAT WITH LOCK

- Before standing up from the operator's seat (such as when opening or closing the front window or roof window, or when removing or installing the bottom window, or when adjusting the operator's seat), lower the work equipment completely to the ground, set safety lock lever (1) securely to the LOCK position, then stop the engine. If you accidentally touch the levers when they are not locked, there is a hazard that the machine may suddenly move and cause serious injury or property damage.



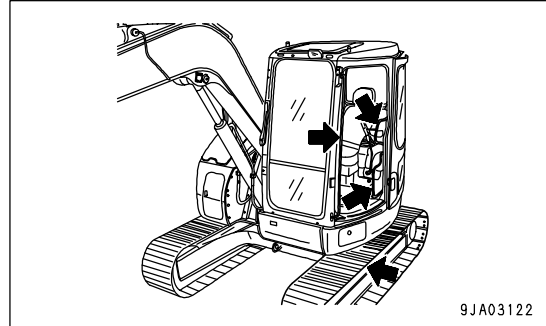
- When leaving the machine, always lower the work equipment completely to the ground, set safety lock lever (1) securely to the LOCK position, then stop the engine. Use the key to lock all the equipment. Always remove the key, take it with you, and keep it in the specified place.



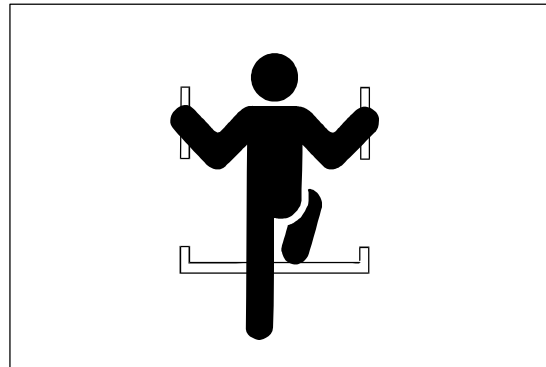
HANDRAILS AND STEPS

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 (including the track shoe) to ensure that you support yourself.
- 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.
- Before getting on or off the machine, check the handrails and steps (including the track shoe). If there is any oil, grease, or mud on the handrails or steps (including the track shoe), wipe it off immediately. Always keep these parts clean. 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 PERSONS ON ATTACHMENTS

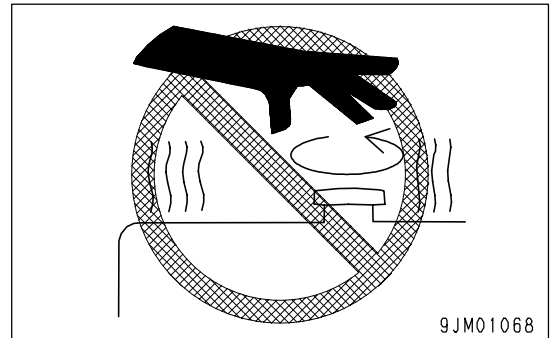
Never let anyone ride on the work equipment, or other attachments. There is a hazard of falling and suffering serious injury.

DO NOT GET CAUGHT IN ARTICULATED PORTION

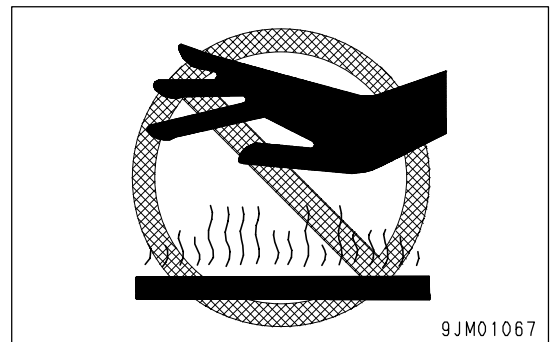
The clearance around the work equipment will change according to the movement of the link. If you get caught, this may lead to serious personal injury. Do not allow anyone to approach any rotating or telescoping part.

BURN PREVENTION**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 from hot oil spurting out when checking or draining the oil, wait for the oil to cool to a temperature where it is possible to touch the cap or plug by hand before starting the operation. Even when the oil has cooled down, loosen the cap or plug slowly to relieve the internal pressure before removing the cap or plug.

**FIRE PREVENTION AND EXPLOSION 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.

WINDSHIELD WASHER FLUID

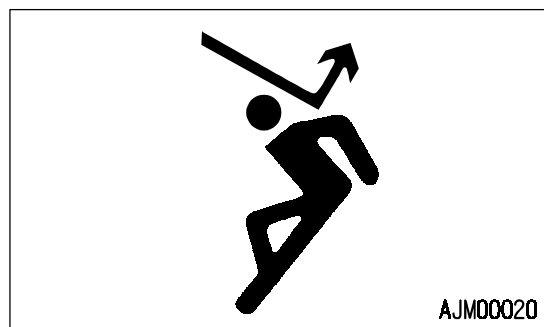
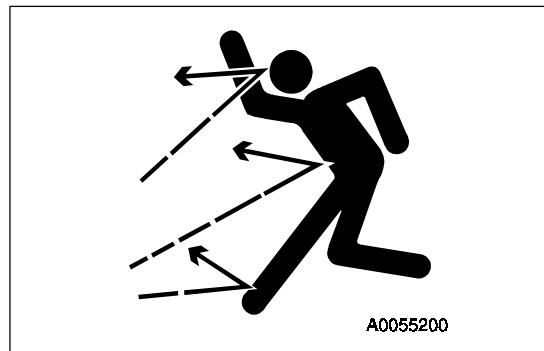
Use an ethyl alcohol base washer liquid.

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

FALLING OBJECTS, FLYING OBJECTS AND INTRUDING OBJECTS PREVENTION

On jobsites where there is a hazard that falling objects, flying objects, or intruding objects may hit or enter the operator's cab, consider the operating conditions and install the necessary guards to protect the operator.

- When carrying out demolition or breaker operations, install a front guard and use a laminated coating sheet on the front glass.
- When working in mines or quarries where there is a hazard of falling rock, install FOPS (Falling Objects Protective Structure) and a front guard, and use a laminated coating sheet on the front glass.
- When carrying out the above operations, always close the front window. In addition, always ensure that bystanders are a safe distance away and are not in hazard from falling or flying objects.
- The above recommendations assume that the conditions are for standard operations, but it may be necessary to add additional guards according to the operating conditions on the jobsite. Always contact your Komatsu distributor for advice.



ATTACHMENT INSTALLATION

- 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.

ATTACHMENT COMBINATIONS

Depending on the type or combination of work equipment, there is a hazard that the work equipment may hit the cab or other parts of the machine. Before using unfamiliar work equipment, check if there is any hazard of interference, and operate with caution.

CAB WINDOW GLASSES

- If a pane of the cab window on the work equipment side is broken, the work equipment may directly hit the operator. In that case, stop the machine immediately and replace the broken pane with new one.
- The ceiling window is made of organic glass (polycarbonate), and as such it is apt to break easily when receiving damage on the surface, thereby deteriorating its protective characteristic. If there is a crack or damage caused by a fallen rock, or when any sign of them is noticed, replace it with a new window.

UNAUTHORIZED MODIFICATIONS

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, product failures or other property damages resulting from modifications made without authorization from Komatsu.

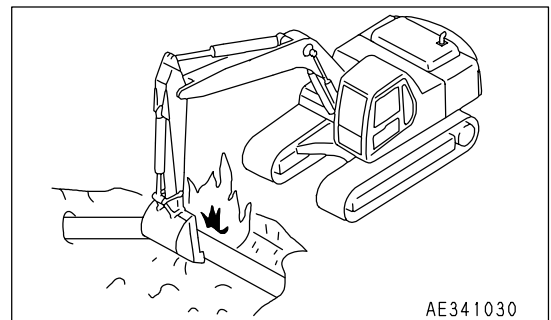
SAFETY AT JOBSITE

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.



WORKING ON LOOSE GROUND

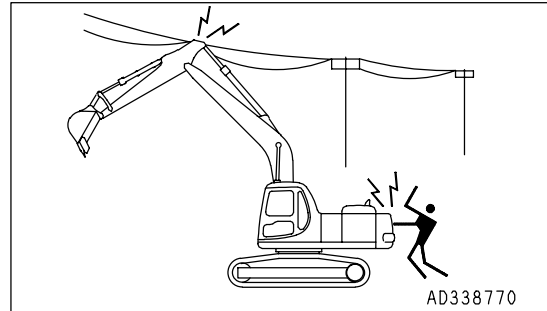
- Avoid traveling or operating your machine too close to the edge of cliffs, overhangs, and deep ditches. The ground may be weak in such areas. If the ground should collapse under the weight or vibration of the machine, there is a hazard that the machine may fall or tip over. Remember that the soil after 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.

DISTANCE 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.

Voltage of Cables	Safety Distance
100 V - 200 V	Over 2 m (7ft)
6,600 V	Over 2 m (7ft)
22,000 V	Over 3 m (10 ft)
66,000 V	Over 4 m (14 ft)
154,000 V	Over 5 m (17 ft)
187,000 V	Over 6 m (20 ft)
275,000 V	Over 7 m (23 ft)
500,000 V	Over 11 m (36 ft)

ENSURE GOOD VISIBILITY

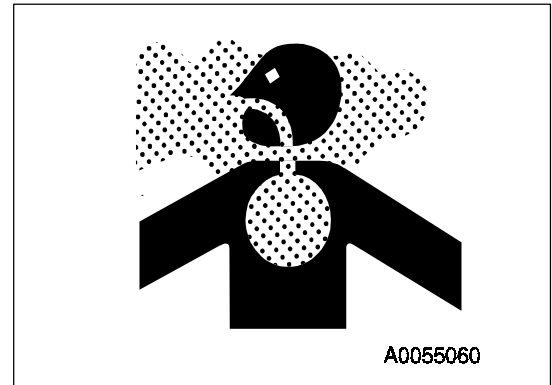
Check for any persons or obstacles in the area around the machine and check the conditions of the jobsite to ensure that operations and travel can be carried out safely. Always do as follows.

- 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 AREA

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.



SIGNALMAN'S SIGNAL 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

If for any reason, it becomes impossible to open the cab door, use the hammer supplied to break the window and use it as an emergency escape.

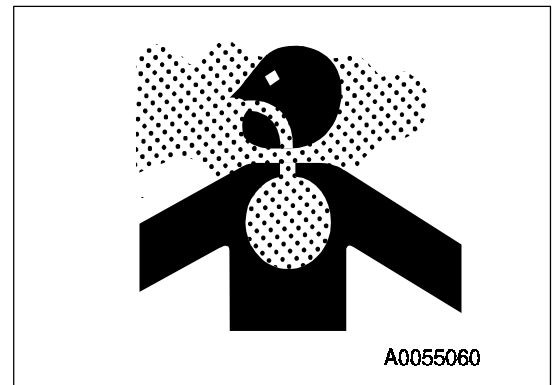
For details, see "EMERGENCY ESCAPE HAMMER (PAGE 3-30)" in this manual.

- When escaping, remove all the pieces of glass from the window frame first and be careful not to cut yourself on the glass. Be careful also not to slip on the broken pieces of glass on the ground.

ASBESTOS DUST HAZARD PREVENTION

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.



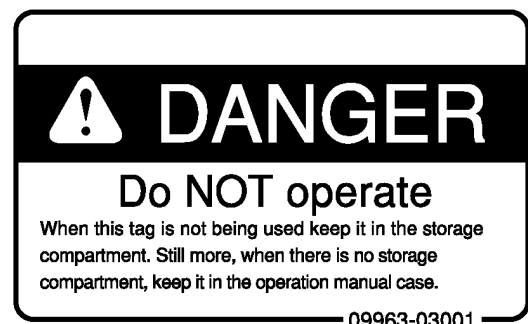
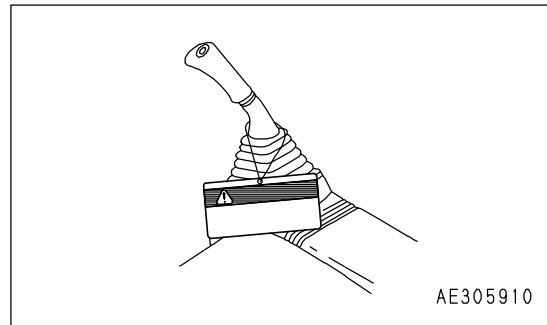
- Always observe the rules and regulations for the work site and environmental standards.

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

SAFETY MACHINE OPERATION

STARTING ENGINE

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



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 working lamps, 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.
- 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 angle of the rearview mirror so that viewed from the operator's seat, the rear lower part of the machine (whose view is usually blocked by the engine hood) can be clearly seen. For this adjustment, see the section of "Rearview Mirrors (PAGE 3-66)" in this manual.
- Check that there are no persons or obstacles above, below, or in the area around the machine.

SAFETY RULES FOR STARTING ENGINE

- Start and operate the machine only while seated.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.
- When starting the engine, sound the horn as a warning.
- Do not allow anyone apart from the operator to ride on the machine.
- For machines equipped with a back-up alarm, check that the alarm works properly.

STARTING ENGINE IN COLD WEATHER

- 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 and cause the battery to explode.
Before charging or starting the engine with a different power source, melt the battery electrolyte and check that there is no leakage of electrolyte before starting.

OPERATION

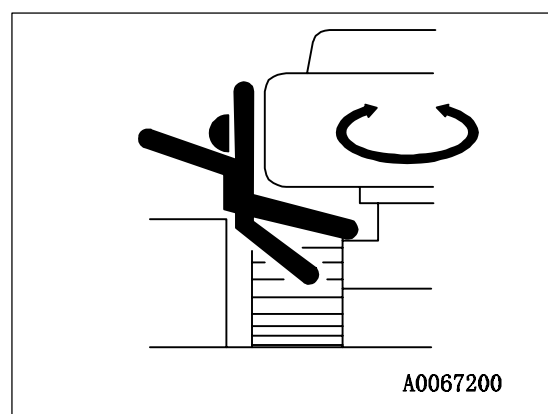
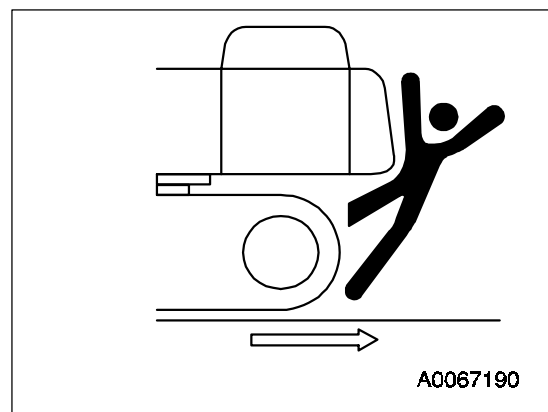
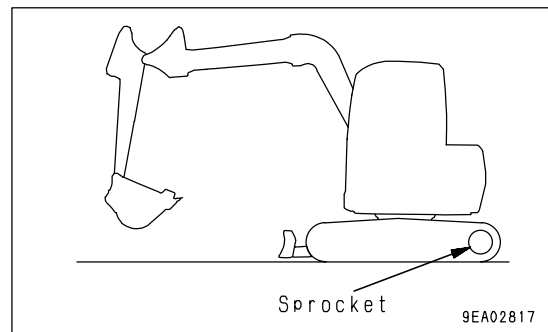
CHECKS BEFORE OPERATION

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 that the movement of the machine matches the display on the control pattern card. If it does not match, replace it immediately with the correct control pattern card.
- Check the operation of the work equipment, travel system and swing system.
- 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.

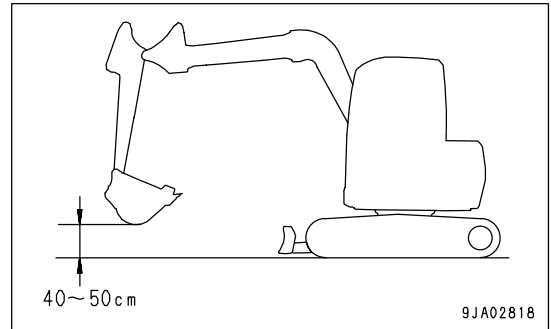
SAFETY RULES FOR CHANGING MACHINE DIRECTIONS

- Before traveling, position the upper structure so that the sprocket is at the rear of the operator's cab. If the sprocket is at the front of the operator's cab, the machine makes a movement reverse to the control lever movement (for example, forward becomes reverse, and left becomes right). Be careful to avoid such a reverse movement of the machine.
- 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 travel alarm 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.

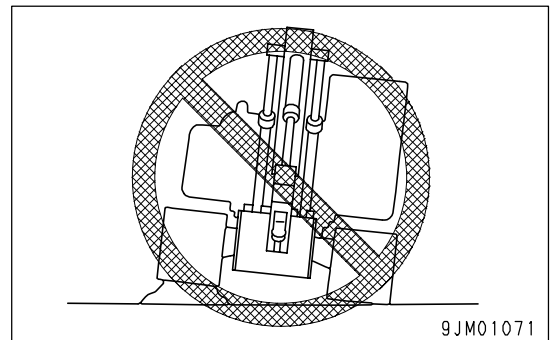


SAFETY RULES FOR TRAVELING

- It is dangerous to drive too fast, or to start suddenly, stop suddenly, or to turn sharply.
- When traveling on level ground, keep the work equipment at a height of 40 to 50 cm (1.6 to 2.0 in) from the ground.
- 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.



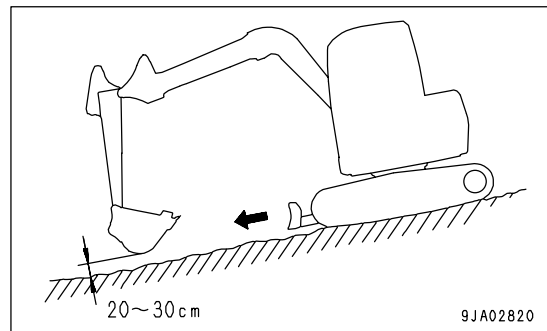
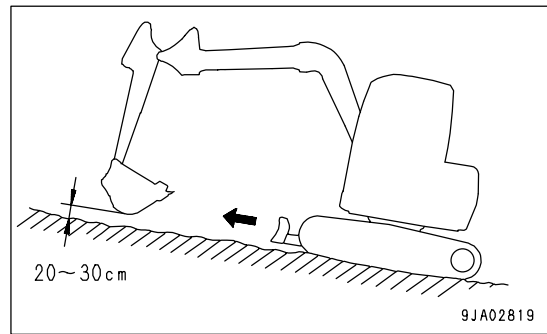
- Avoid traveling over obstacles when possible. If the machine has to travel over an obstacle, keep the work equipment close to the ground and travel at low speed. Never travel over obstacles which make the machine tilt strongly to one side.
- When traveling or carrying out operations, always keep a 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.



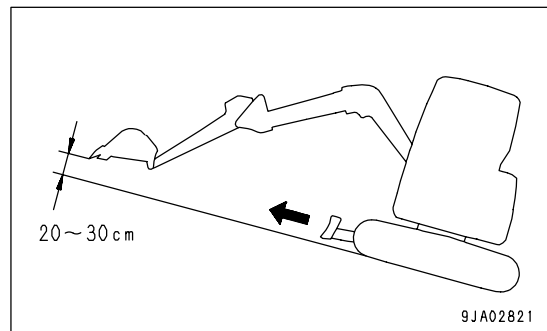
TRAVELING ON SLOPES

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

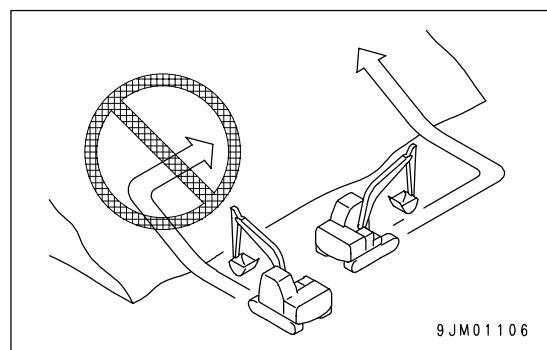
- Keep the work equipment approx. 20 to 30 cm (8 to 12 in) above the ground. In case of emergency, lower the work equipment to the ground immediately to help stop the machine.
- When travel up slopes, set the operator's cab facing uphill, when travel down slopes, set the operator's cab facing downhill. Always check the firmness of the ground under the front of the machine when traveling.



- When traveling up a steep slope, extend the work equipment to the front to improve the balance, keep the work equipment approximately 20 to 30cm (8 to 12 in) above the ground, and travel at low speed.
- When traveling downhill, lower the engine speed, keep the travel lever close to the neutral position, and travel at low speed.

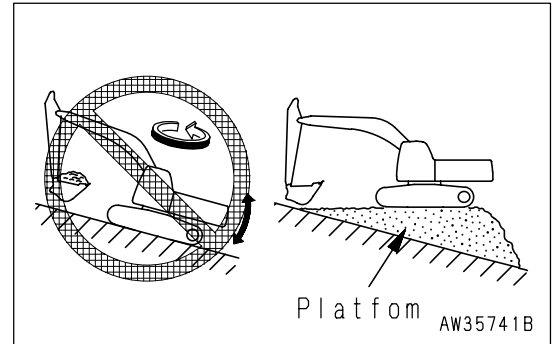


- Always travel straight up or down a slope. Traveling at an angle or across the slope is extremely dangerous.
- Do not turn on slopes or travel across slopes. Always go down to a flat place to change the position of the machine, then travel on to the slope again.
- Travel on grass, fallen leaves, or wet steel plates with low speed. Even with slight slopes there is a hazard that the machine may slip.
- If the engine stops when the machine is traveling on a slope, move the control levers immediately to the neutral position and start the engine again.



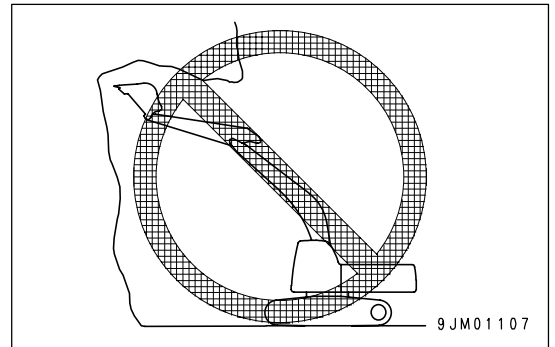
OPERATIONS ON SLOPES

- When working on slopes, there is a hazard that the machine may lose its balance and turn over when the swing or work equipment are operated. This may lead to serious injury or property damage, so always provide a stable place when carrying out these operations, and operate carefully.
- Do not swing the work equipment from the uphill side to the downhill side when the bucket is loaded. This operation is dangerous, and may cause the machine to tip over.
- If the machine has to be used on a slope, pile the soil to make a platform that will keep the machine as horizontal as possible.

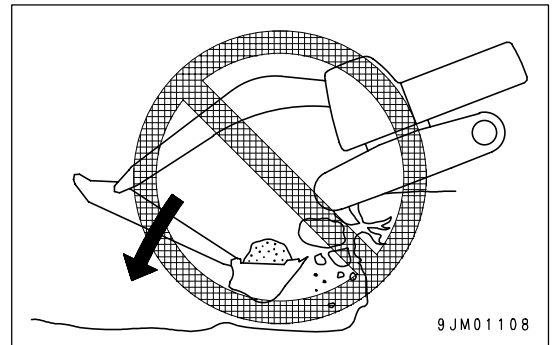


PROHIBITED OPERATIONS

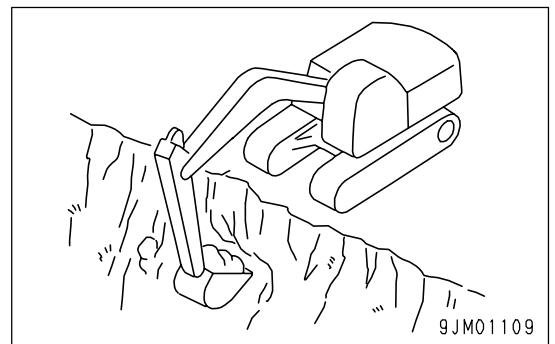
- Never dig the work face under an overhang. There is a hazard that rocks may fall or that the overhang may collapse and fall on top of the machine.



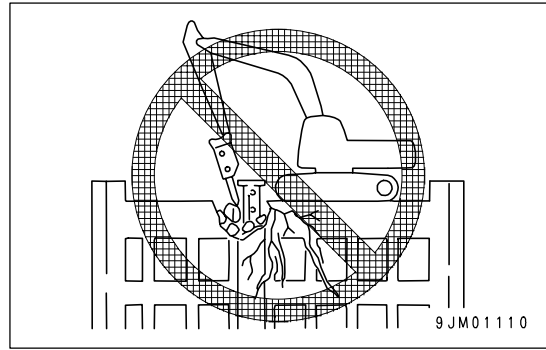
- Do not excavate too deeply under the front of the machine. The ground under the machine may collapse and cause the machine to fall.



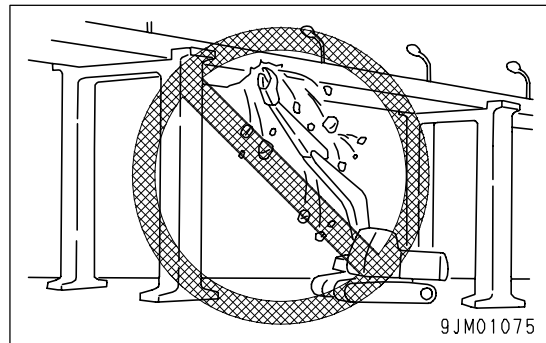
- To make it easier to escape if there is any problem, set the tracks at right angles to the road shoulder or cliff with the sprocket at the rear when carrying out operations.



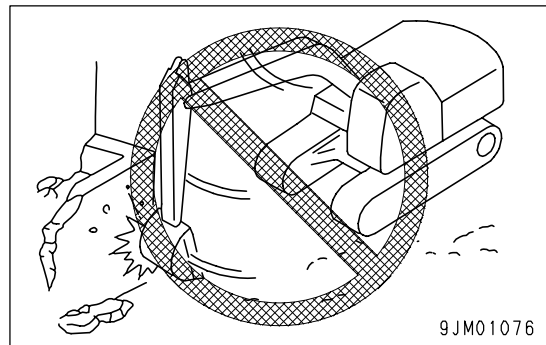
- Do not carry out demolition work under the machine. There is a hazard that the machine may become unstable and tip over.
- When working on or from the top of buildings or other structures, check the strength and the structure before starting operations. There is a hazard of the building collapsing and causing serious injury or damage.



- When carrying out demolition work, do not carry out demolition above your head. There is a hazard of broken parts falling or of the building collapsing and causing serious injury or property damage.



- Do not use the impact force of the work equipment for breaking work. There is a hazard of damage to the work equipment or a hazard of serious personal injury being caused by flying pieces of broken materials or the machine tipped over due to reaction from the impact.
- Generally speaking, the machine is more liable to overturn when the work equipment is at the side than when it is at the front or rear.



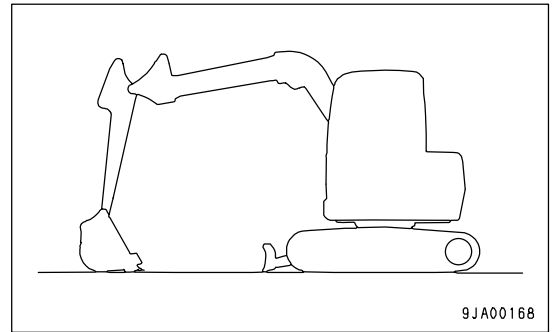
- When using a breaker or other heavy work equipment, there is a hazard of the machine losing its balance and tipping over. When operating on flat ground as well as on slopes.
 - Do not suddenly lower, swing, or stop the work equipment.
 - Do not suddenly extend or retract the boom cylinder. There is a hazard that impact will cause the machine to tip over.
- 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.

OPERATIONS ON SNOW

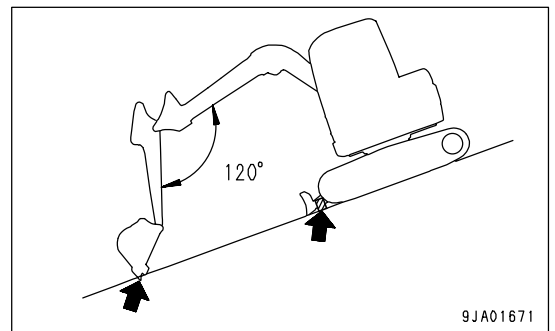
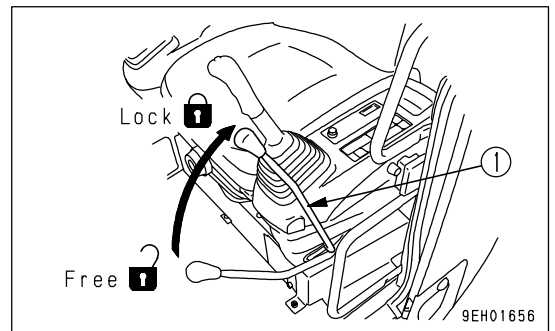
- Snow-covered or frozen surfaces are slippery, so be extremely careful when traveling or operating the machine, and do not operate the levers suddenly. Even a slight slope may cause the machine to slip, so be particularly careful when working on slopes.
- With frozen ground surfaces, the ground becomes 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.

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, then 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, always do as follows.
 - Set the bucket on the downhill side, then dig it into the ground.
 - Put blocks under the tracks to prevent the machine from moving.



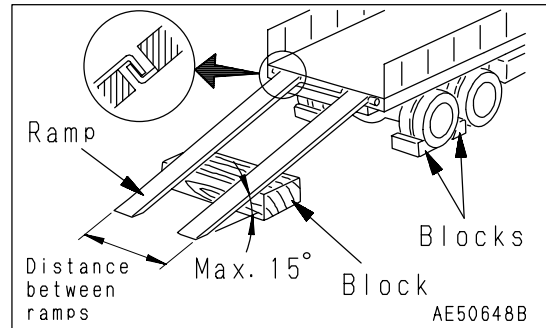
TRANSPORTATION

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.
- Never use the work equipment to load or unload the machine. There is danger that the machine may fall or tip over.
- 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, be extremely careful since the ramp surface is slippery.
- Run the engine at low speed and travel slowly.
- When on the ramps, do not touch any other parts.
- Never correct your steering on the ramps. If necessary, drive off the ramps, correct the direction, then enter the ramps again.
- The center of gravity of the machine will change suddenly at the joint between the ramps and the track or trailer, and there is danger of the machine losing its balance. Travel slowly over this point.
- When loading or unloading to an embankment or platform, make sure that it has suitable width, strength, and grade.
- When swinging the upper structure on the trailer, the trailer is unstable, so pull in the work equipment and swing slowly. And turn swing lock switch ON to apply swing lock after loading machine.
- 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 (PAGE 3-108)".
- After the loading, fasten the machine securely with a wire rope and wooden blocks to prevent the machine from moving.



SHIPPING THE MACHINE

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

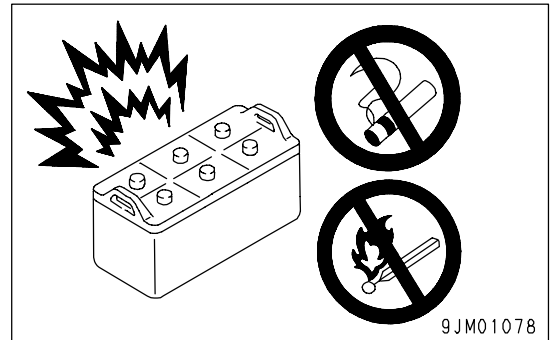
- The weight, transportation height, and overall length of the machine differ according to the work equipment, so be sure to confirm the dimensions.
- When passing over bridges or structures on private land, check first that the structure is strong enough to support the weight of the machine. When traveling on public roads, check first with the relevant authorities and follow their instructions.
- For details of the shipping procedure, see "TRANSPORTATION (PAGE 3-108)" in the OPERATION section.

BATTERY

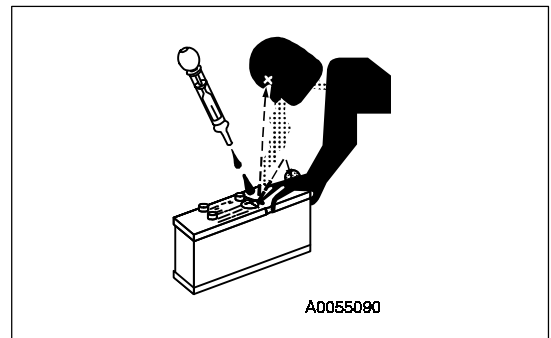
BATTERY HAZARD PREVENTION

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.

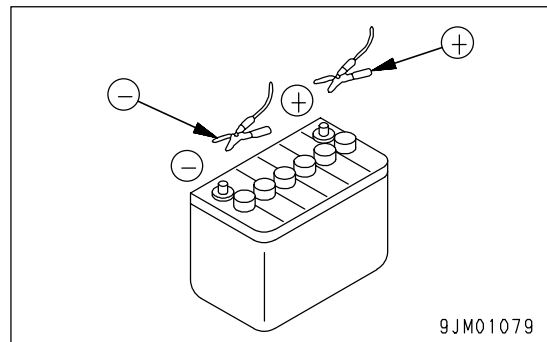
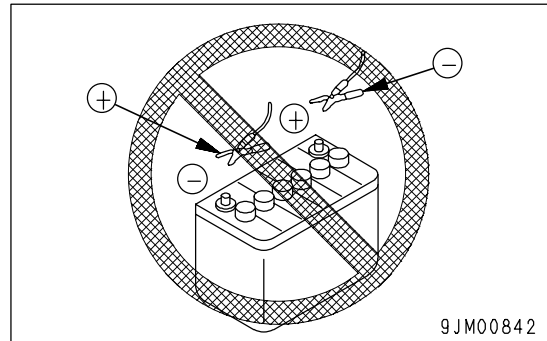
As there is a hazard that sparks will be generated, always do as follows.

- 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. Tighten the battery terminals 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 ENGINE 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 "Starting Engine With Booster Cables (PAGE 3-125)" in the OPERATION section.



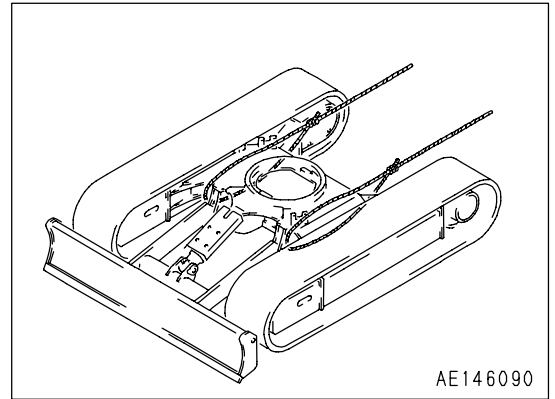
TOWING

SAFETY RULES FOR TOWING

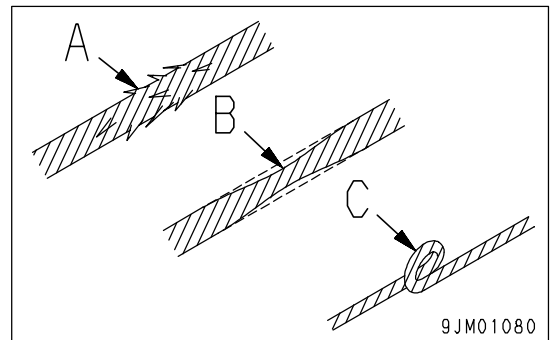
Serious injury or death could result if a disabled machine is towed incorrectly or if there is a mistake in the selection or inspection of the wire rope.

For towing, see "TOWING THE MACHINE (PAGE 3-120)".

- Always wear leather gloves when handling wire rope.
- Fix the wire rope to the track frame.
- During the towing operation, never stand between the towing machine and the machine being towed.
- Never tow a machine on a slope.
- Put a wooden block in between the wire ropes and the machine to prevent damage to the machine due to friction.



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



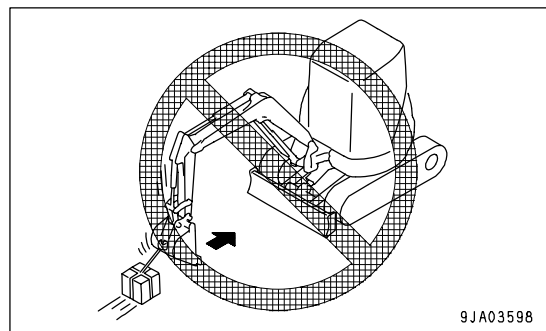
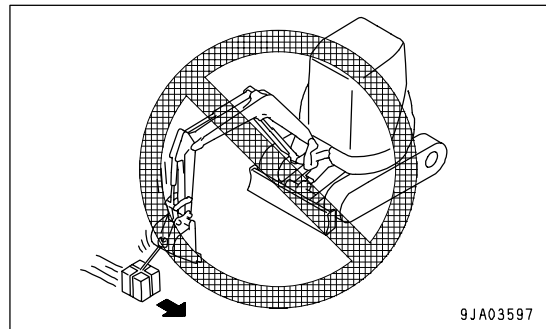
LIFTING OBJECTS WITH BUCKET

SAFETY RULES FOR LIFTING OBJECTS

- Do not carry out lifting work on slopes, soft ground, or other places where the machine is not stable.
- Use wire rope that conforms to the specified standard.
- Do not exceed the specified lifting load.

For details of the maximum lifting load permitted for this machine, see "BUCKET WITH HOOK (PAGE 6-4)".

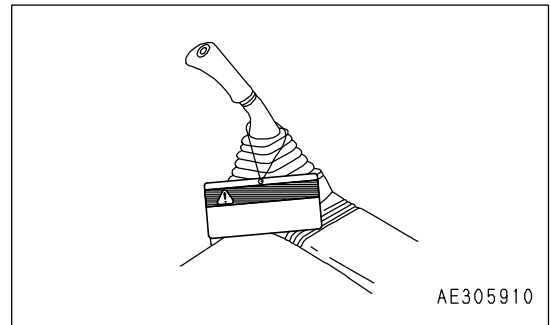
- It is dangerous if the load hits any worker or structure. Always check carefully that the surrounding area is safe before swinging or turning the machine.
- Do not start, swing, or stop the machine suddenly. There is a hazard that the lifted load will swing.
- Do not pull the load to the side or in towards the machine.
- Do not leave the operator's seat when there is a raised load.



SAFETY MAINTENANCE INFORMATION

WARNING TAG

- Always attach the "DO NOT OPERATE" warning tag to the work equipment control lever in the operator's cab to alert others that you are performing service or maintenance on the machine. Attach additional warning tags around the machine if necessary. Warning tag Part No. 09963-03001
Keep this warning tag in the tool box while it is not used. If there is no toolbox, 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.
- When cleaning the ceiling window which is made of organic glass (polycarbonate), use tap water and avoid use of organic solvents for cleaning. An organic solvent like benzene, toluene or methanol can invite a chemical reaction like dissolution and decomposition on the window glass, deteriorating polycarbonate in use.

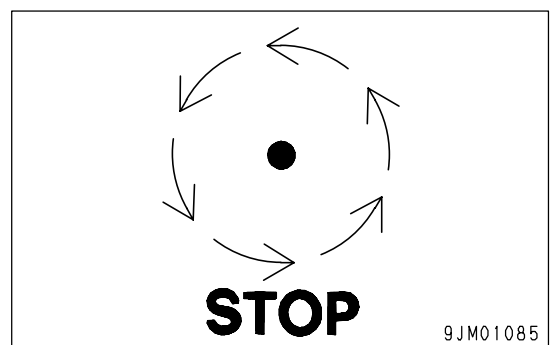
APPOINT LEADER WHEN WORKING WITH OTHERS

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

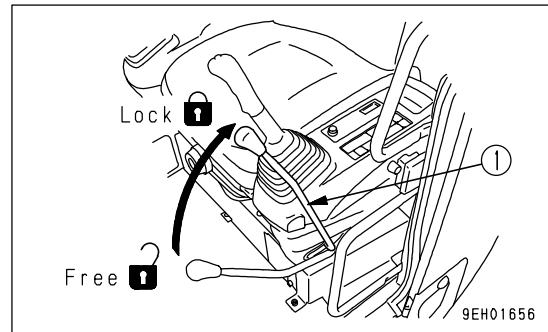
When working with others, misunderstandings between workers can lead to serious accidents.

STOP ENGINE BEFORE CARRYING OUT MAINTENANCE

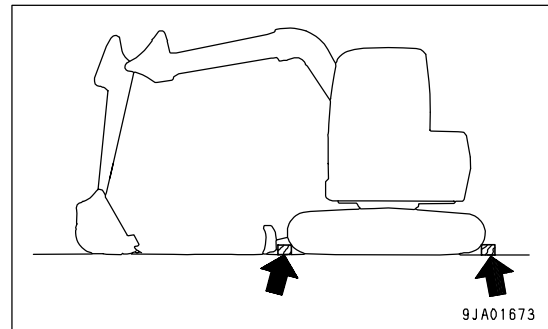
- Stop the machine on firm, level ground.
- Select a place where there is no hazard of falling rocks or landslides, or of flooding if the land is low.
- Lower the work equipment completely to the ground and stop the engine.



- Set safety lock lever (1) to the LOCK position.



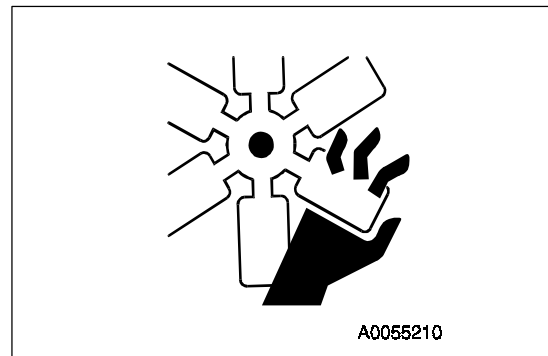
- Put blocks under the track to prevent the machine from moving.



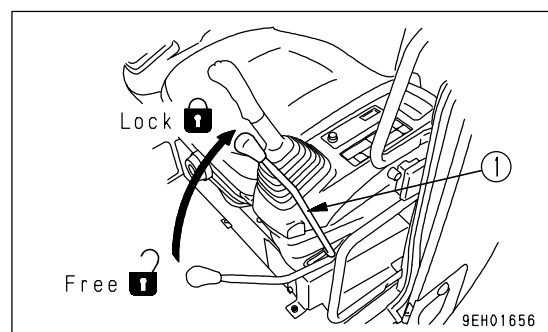
TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING

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.

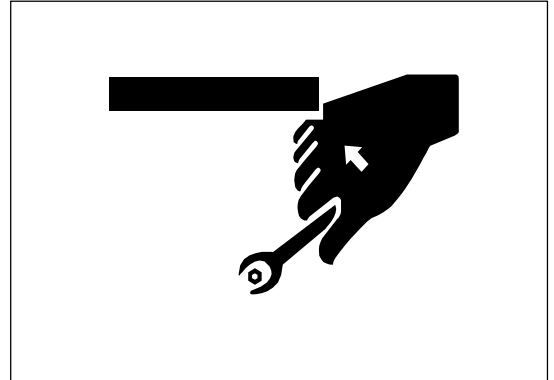


- Set safety lock lever (1) to the LOCK position.
- When carrying out operations near the fan, fan belt, or other rotating parts, there is a hazard of being caught in the parts, so be careful not to come close.
- Do not touch any control levers. If any control lever must be operated, give a signal to the other workers to warn them to move to a safe place.
- Never drop or insert tools or other objects into the fan or fan belt. Parts may break or be sent flying.



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.

**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.

**WORK UNDER THE MACHINE**

- If it is necessary to go under the work equipment or the machine to carry out service and maintenance, support the work equipment and machine securely with blocks and stands strong enough to support the weight of the work equipment and machine.
- It is extremely dangerous to work under the machine if the track shoes are lifted off the ground and the machine is supported only with the work equipment. If any of the control levers is touched by accident, or there is damage occurring to the hydraulic piping, the work equipment or the machine will suddenly drop. This is extremely dangerous. Never work under the work equipment or the machine.

**NOISE**

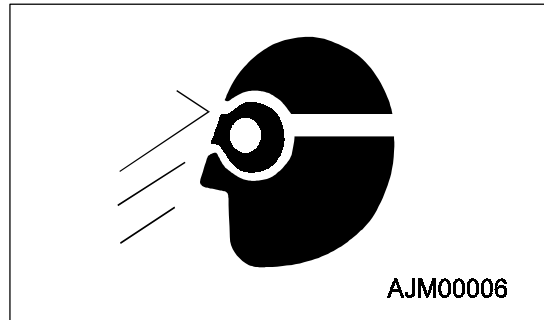
When carrying out maintenance of the engine and you are exposed to noise for long periods of time, wear ear covers or ear plugs while working.

If the noise from the machine is too loud, it may cause temporary or permanent hearing problems.

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.
- There is a hazard that the pin hit with strong force may fly out and injure people in the surrounding area.

**WELDING WORKS**

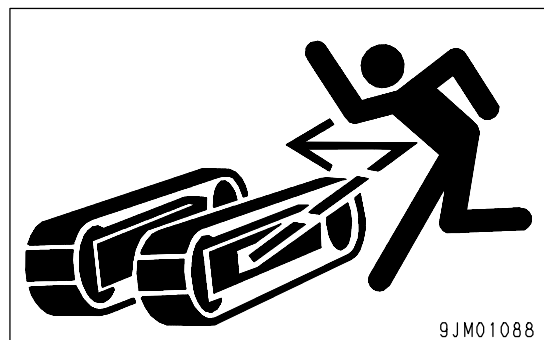
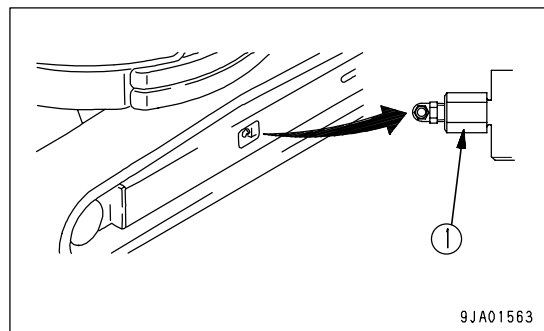
Welding operations must always be carried out by a qualified welder and in a place equipped with proper equipment. There is a hazard of gas, fire, or electrocution when carrying out welding, so never allow any unqualified personnel to carry out welding.

REMOVING BATTERY TERMINALS

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

SAFETY FIRST WHEN USING HIGH-PRESSURE GREASE TO ADJUST TRACK TENSION

- Grease is pumped into the track tension adjustment system under high pressure. If the specified procedure for maintenance is not followed when making adjustment, grease drain plug (1) may fly out and cause serious injury or property damage.
- When loosening grease drain plug (1) to loosen the track tension, never loosen it more than one turn. Loosen the grease drain plug slowly.
- Never put your face, hands, feet, or any other part of your body close to grease drain plug (1).

**DO NOT DISASSEMBLE RECOIL SPRINGS**

Never attempt to disassemble the recoils spring assembly. It contains a spring under high pressure which serves as a shock absorber for the idler. If it is disassembled by mistake, the spring will fly out and cause serious injury. When it becomes necessary to disassemble it, ask your Komatsu distributor to do the work.

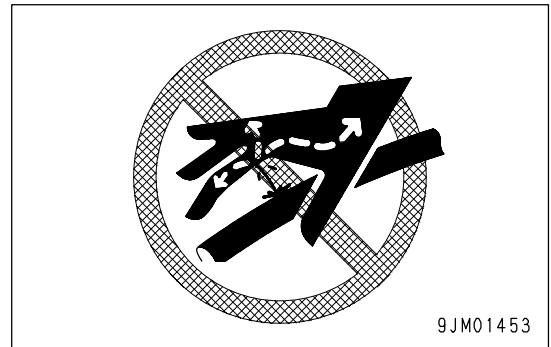
SAFETY RULES FOR HIGH-PRESSURE OIL

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, so always do as follows.

- Always release the pressure before starting any inspection or replacement operation.
- 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.



SAFETY 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. 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.

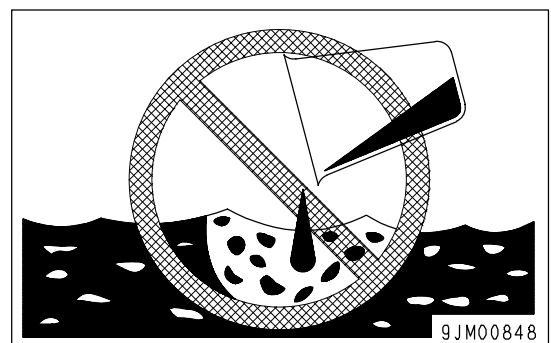
Replace the hose if any of the following problems are found.

- Damaged or leaking hydraulic fitting.
- Frayed or cut covering or exposed reinforcement wire layer.
- Covering swollen in places.
- Twisted or crushed movable portion.
- Foreign material embedded in covering.

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.



AIR CONDITIONER MAINTENANCE

(If equipped)

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

COMPRESSED AIR

- When carrying out cleaning with compressed air, there is a hazard of serious injury 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

- For using the machine safely for an extended period of time, replace safety-critical parts like hoses and seat belts periodically.

Replacement of safety-critical parts: See "SAFETY CRITICAL PARTS (PAGE 4-13)".

- 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 death. 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.

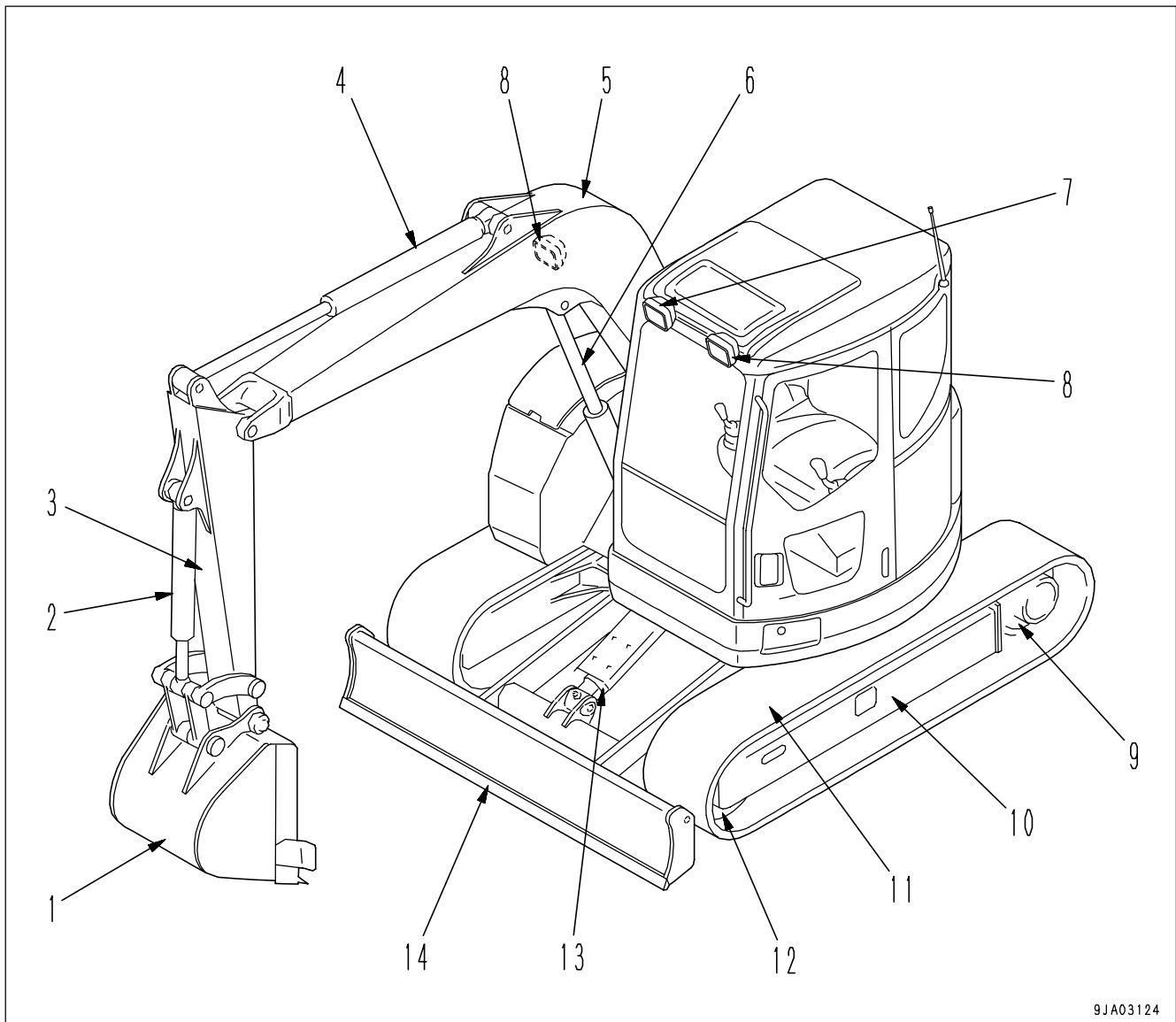
OPERATION

WARNING

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

MACHINE VIEW ILLUSTRATIONS

OVERALL MACHINE VIEW

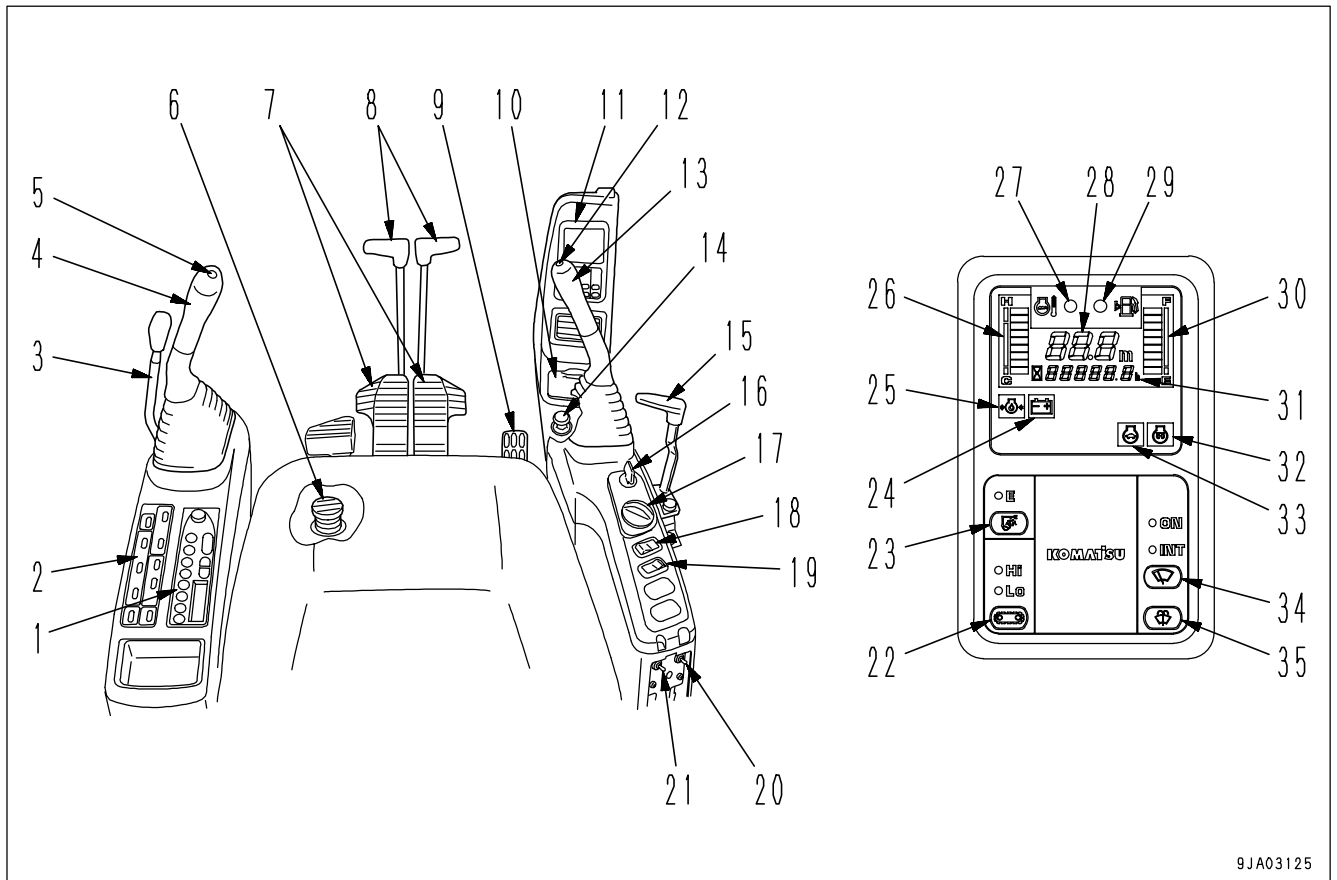


9JA03124

- (1) Bucket
- (2) Bucket cylinder
- (3) Arm
- (4) Arm cylinder
- (5) Boom
- (6) Boom cylinder
- (7) Additional lamp (if equipped)

- (8) Working lamp
- (9) Sprocket
- (10) Track frame
- (11) Track shoe
- (12) Idler
- (13) Blade cylinder
- (14) Blade

CONTROLS AND GAUGES



9JA03125

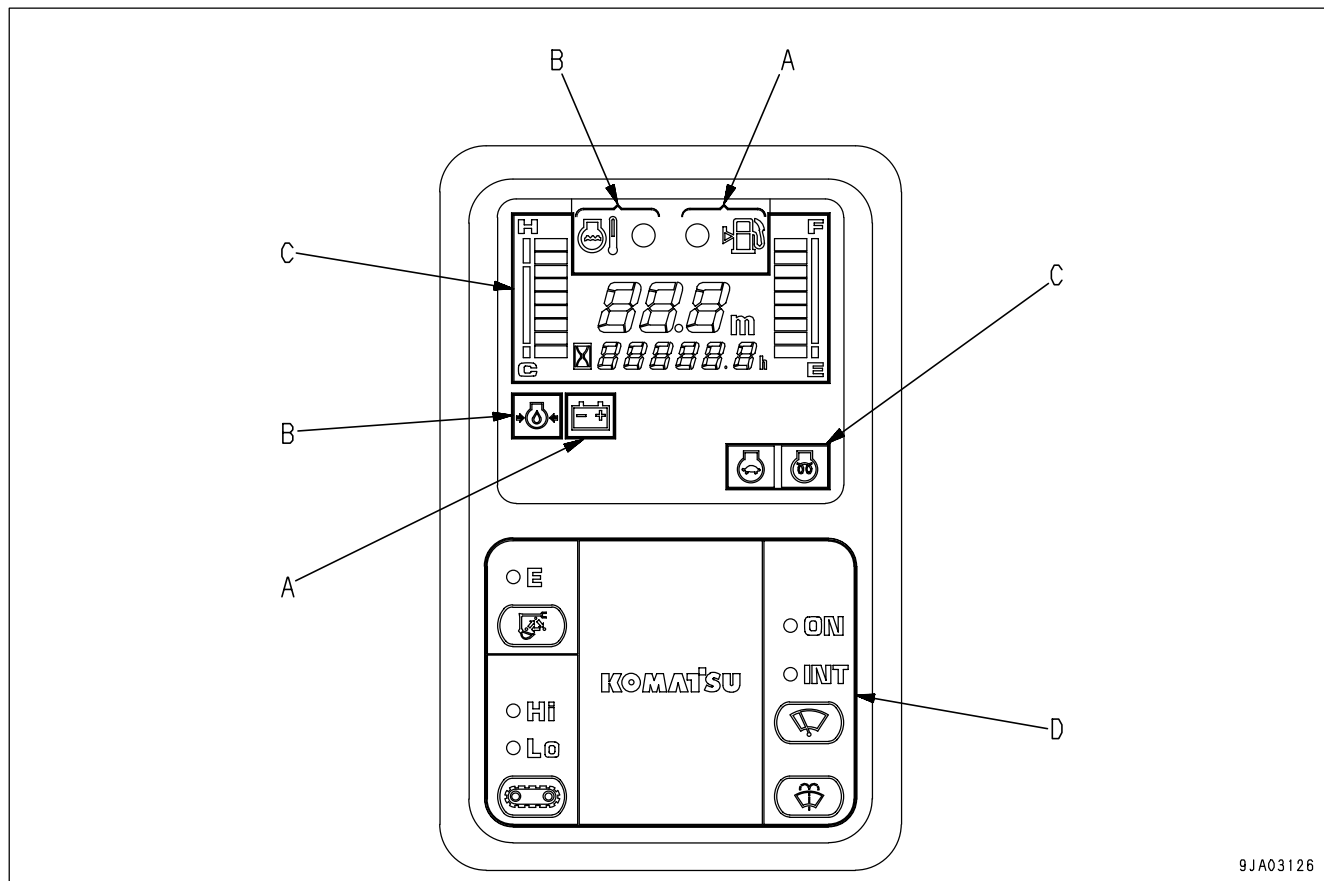
- | | |
|--|---|
| (1) Car radio | (19) Alarm buzzer stop switch |
| (2) Heater control panel | (20) Emergency pump drive switch |
| (3) Safety lock lever | (21) Swing brake cancel switch |
| (4) Left work equipment control lever | (22) Travel speed selector switch |
| (5) Swift deceleration switch | (23) Working mode selector switch |
| (6) Traveling accelerator pedal | (24) Charge level monitor |
| (7) Travel pedals | (25) Engine oil pressure monitor |
| (8) Travel levers | (26) Engine coolant temperature gauge |
| (9) Attachment control pedal (if equipped) | (27) Engine coolant temperature monitor |
| (10) Ashtray | (28) Display (for failure display) |
| (11) Machine monitor | (29) Fuel level monitor |
| (12) Horn button | (30) Fuel gauge |
| (13) Right work equipment control lever | (31) Service meter |
| (14) Cigarette lighter | (32) Pre-heating monitor |
| (15) Blade control lever | (33) Swift deceleration pilot lamp |
| (16) Starting switch | (34) Wiper switch |
| (17) Fuel control dial | (35) Window washer switch |
| (18) Lamp switch | |

DETAILED CONTROLS AND GAUGES

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.

MONITORING SYSTEM



9JA03126

A: Caution monitors
 B: Emergency monitors

C: Meter display portion
 D: Monitor switch portion

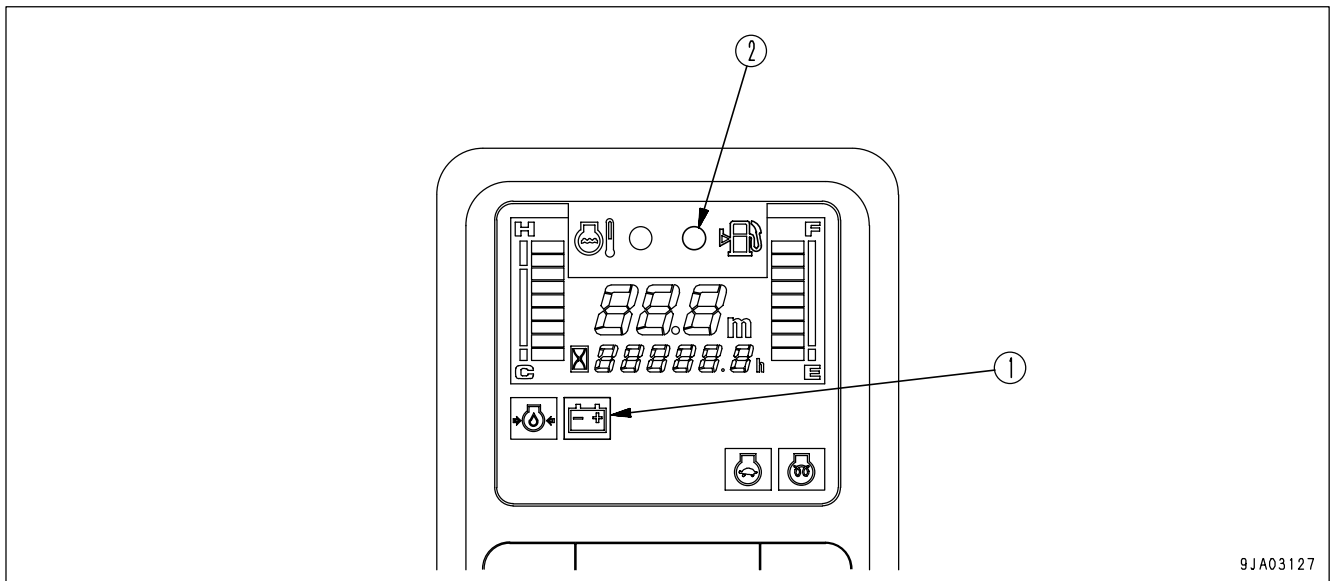
Caution Monitors



If the warning monitor flashes, check the problem point as soon as possible and carry out maintenance. Failure to repair the problem will lead to failure of the machine.

These are items which need to be observed when the engine is running. If any abnormality occurs, the item needing immediate repair is display.

If any abnormality occurs on the machine, the relative monitor begins to flash and the alarming buzzer begins to sound.



(1)Charge level monitor

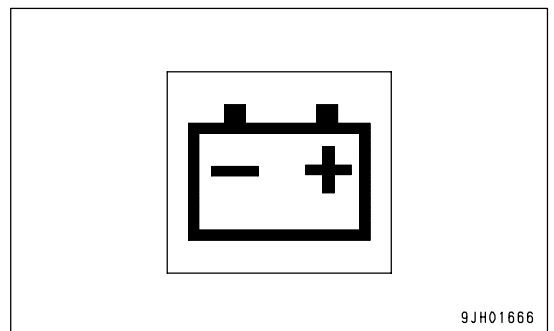
(2)Fuel level monitor

Charge Level Monitor

This monitor(1) indicates an abnormality in the charging system while the engine is running.

If the monitor lamp flashes, check the V-belt tension. If any abnormality is found, see "OTHER TROUBLE (PAGE 3-128)".

If the monitor flashes, stop the engine immediately or run at low idling, then inspect the problem point immediately and repair the problem.



9JH01666

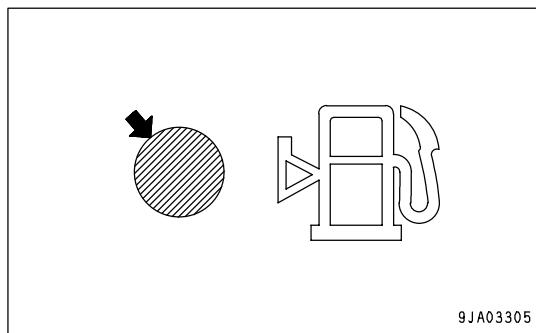
REMARK

- This lamp will light up if the starting switch is turned ON when the engine is stopped, but this does not indicate any abnormality.
- When the engine is started or stopped with the starting switch at the ON position, the lamp may light up and the buzzer may sound momentarily, but this does not indicate any abnormality.

Fuel Level Monitor

This monitor (2) warns against the reduced fuel level in the fuel tank.

When the remaining fuel reaches 30 liters (7.93 US gal) level, the fuel level monitor begins to flash. Then refill fuel without delay.

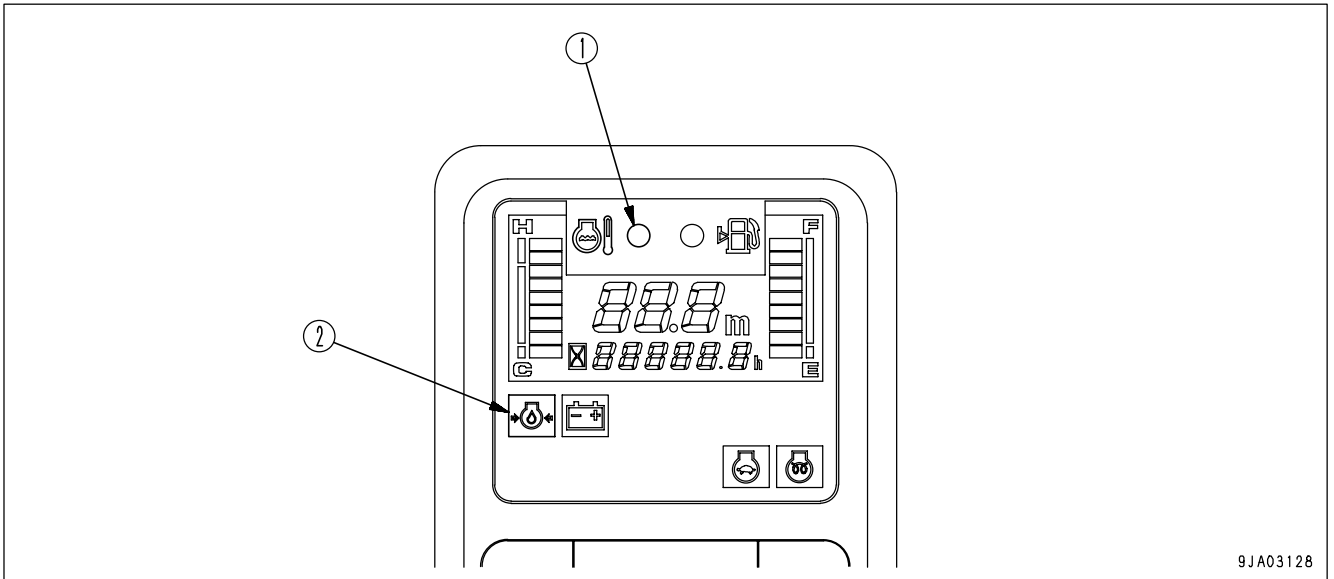


Emergency Monitors

! CAUTION

If the monitor flashes, stop the engine immediately or run at low idling, then inspect the problem point immediately and repair the problem.

These are items which need to be observed when the engine is running. If there is any abnormality, the abnormal location on the monitor will lights up and the buzzer will sound. Carry out the necessary repairs immediately.



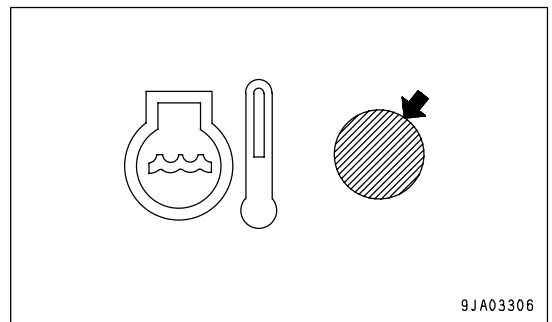
(1) Engine coolant temperature monitor

(2) Engine oil pressure monitor

Engine Water Temperature Monitor

This monitor (1) serves to warn against abnormal rise of the engine cooling water temperature.

When the temperature abnormally goes up, it begins to flash. Then stop the work and keep the engine running at low idling until after the engine cooling water temperature gauge returns to the green range.

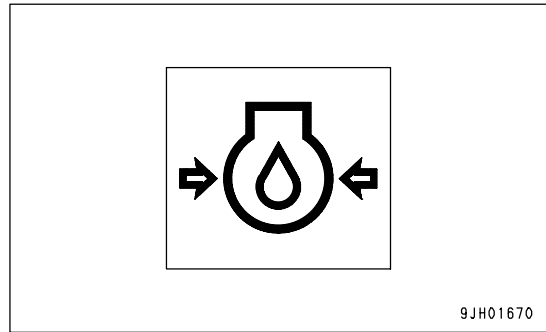


Engine Oil Pressure Monitor

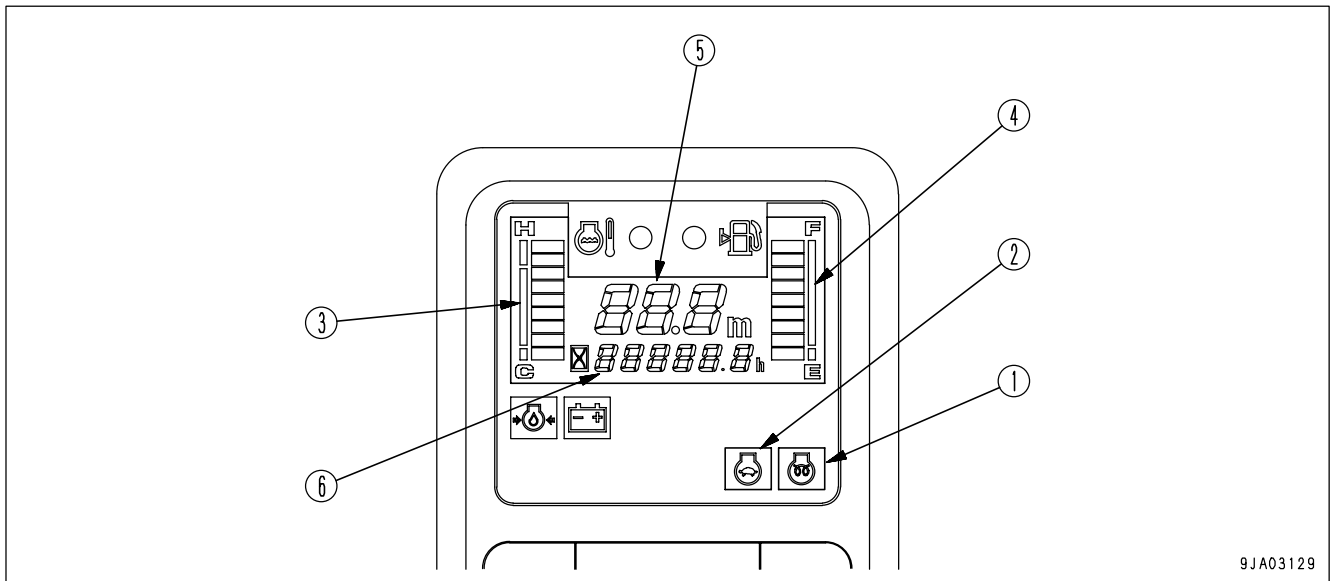
If the engine lubricating pressure is below the normal value, this monitor (2) flashes. If it flashes, stop the engine, and check the oil level in the oil pan and lubricating system.

REMARK

- This lamp will light up if the starting switch is turned ON when the engine is stopped, but this does not indicate any abnormality.
- When the engine is started or stopped with the starting switch at the ON position, the lamp may light up and the buzzer may sound momentarily, but this does not indicate any abnormality.



Meter Display Portion



Pilot Display

- (1) Engine pre-heating monitor
- (2) Swift deceleration monitor

Meter

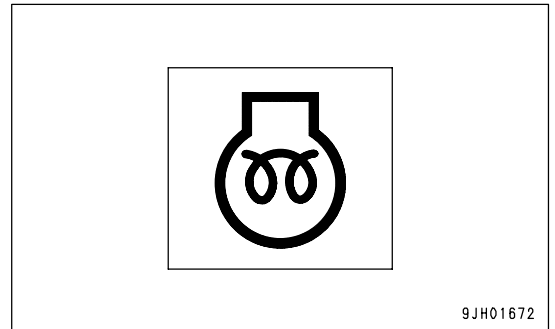
- (3) Engine coolant temperature gauge
- (4) Fuel gauge
- (5) Display
- (6) Service meter

Pilot Display

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

Engine Pre-heating Monitor

This monitor (1) indicates the pre-heating time required when starting the engine at an ambient temperature below 0°C (32°F). The monitor lamp lights up when the engine starting switch is turned to the HEAT position and begins to flash after about 30 seconds to show that the pre-heating is completed. (The monitor lamp will go off after about 10 seconds)



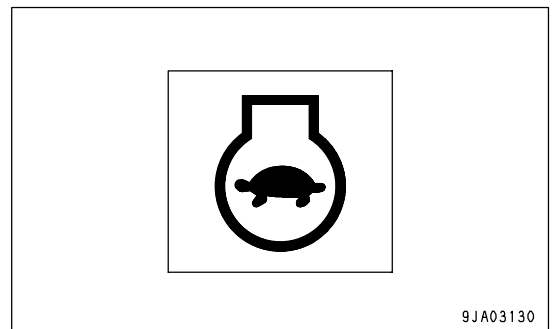
9JH01672

Swift Deceleration Monitor

This monitor (2) informs the operator that the swift deceleration function is being actuated.

- Actuated: Lights up
- Canceled: Goes off

When the swift deceleration switch is pressed, the swift deceleration display monitor lights up. When it is pressed again, the monitor goes off.



9JA03130

REMARK

When the swift deceleration monitor is lights up, the engine speed remains at low idling even if the fuel control dial is operated.

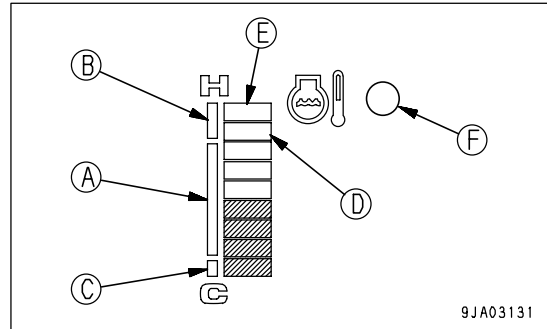
Gauges and Meter

Engine Water Temperature Gauge

This meter (3) shows the engine cooling water temperature. During normal operation, the lamp should light up in the green range (A).

If the lamp in the red range (B) lights up during operation, run the engine at low idling and wait for the temperature to go down to the green range (A).

After starting the engine, continue to warm it up until the engine cooling water temperature rises from white range (C) to green range (A) in the gauge.



REMARK

When Segment (D) lights up, engine cooling water temperature monitor lamp (F) begins to flash, too.

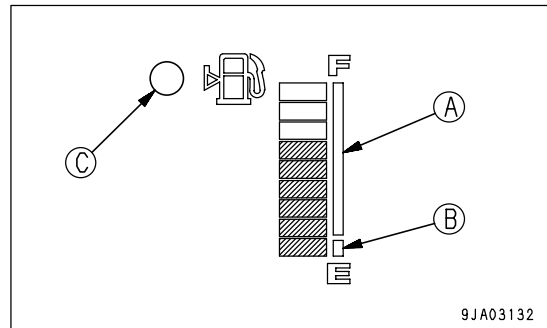
When Segment (E) lights up, engine cooling water temperature monitor lamp (F) begins to flash, too. At the same time, the alarming buzzer begins to sound.

Fuel Gauge

This meter (4) shows the fuel level in the fuel tank. During normal operation, the lamp should light up in the green range (A).

If the lamp in the red range (B) flashes during operation, there is less than 42 liters (11.10 US gal) of fuel remaining, so check and add fuel.

The correct level may not be displayed for a short time after the starting switch is turned to the ON position, but this is not an abnormality.



REMARK

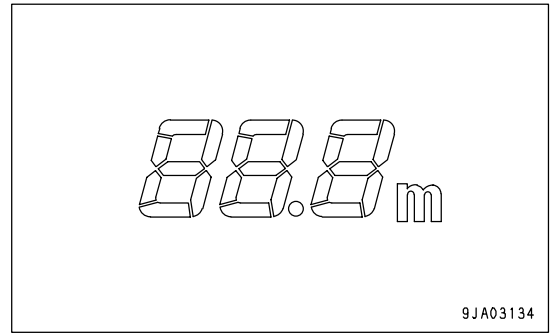
When red range (B) in the fuel gauge lights up, fuel level monitor (C) begins to flash, too.

Display

This monitor (5) serves to display failure contents, if any abnormality occurs on the machine.

REMARK

If the machine has a fault, error information appears while the starting switch is ON. The monitor flashes and displays all error information sequentially.



If the right displays flash, see "Electronic Control System (PAGE 3-132)".

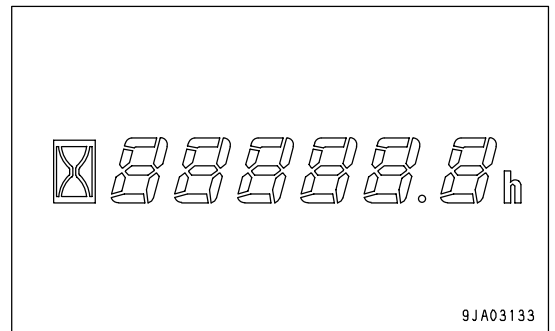
Monitor indications	Error mode
E02	Pump control system error
E03	Swing brake system error
E05	Governor system error

Service Meter

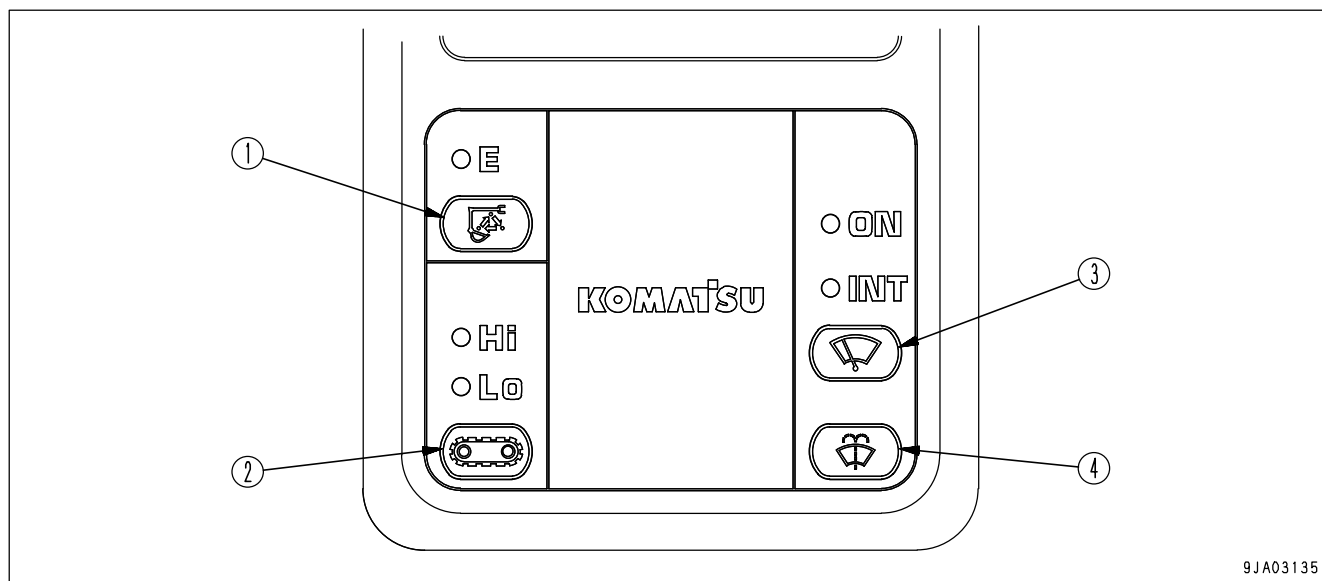
This meter (6) shows the total operation hours of the machine. Set the periodic maintenance intervals using this display.

The service meter advances while the engine is running - even if the machine is not traveling.

The meter will advance by 1 for each 1/10 hour of operation regardless of the engine speed



Monitor Switches Portion



(1) Working mode selector switch
 (2) Travel speed selector switch

(3) Wiper switch
 (4) Window washer switch

Working Mode Selector Switch

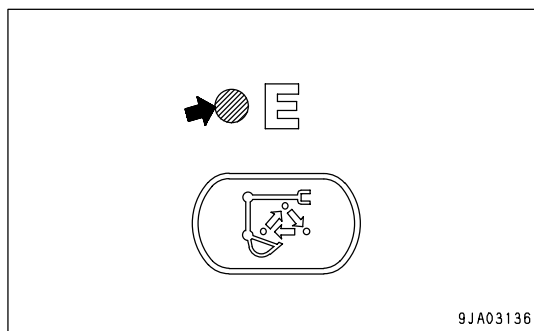
This switch (1) is used to set the power and movement of the work equipment.

Operations can be carried out more easily by selecting the mode to match the type of operation.

E goes off: Active mode (for heavy-load operations)

E lights up: E mode (for operations with emphasis on fuel economy)

The working mode is changed every time the switch is depressed.



REMARK

When starting the engine, the active mode (for heavy-load operations) is automatically set.

Travel Speed Selector Switch



WARNING

- When loading or unloading from a trailer, always travel at low speed. Never operate the travel speed selector switch during the loading or unloading operation.
- If the travel speed is switched between Hi and Lo when the machine is traveling, the machine may deviate to one side, even when traveling in a straight line.
Stop the machine before switching the travel speed.

This switch (2) is used to select high or low travel speed.

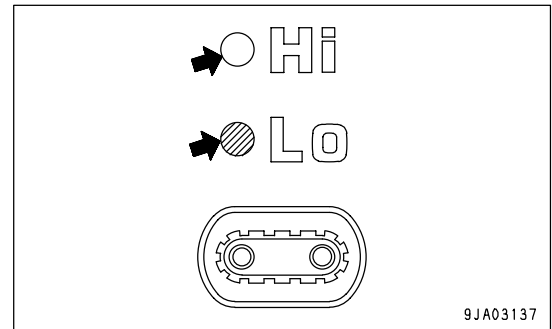
Lo position: Low speed travel

Hi position: High speed travel

The travel speed is changed every time the switch is depressed.

REMARK

- When the engine is started, it is automatically set to Lo speed travel.
- When traveling at high speed (Hi), if travel power is needed when traveling on soft ground or slopes, the travel speed is automatically set to low speed travel (Lo), so there is no need to operate this switch. On the monitor display, the Hi (high speed) lamp stays lighted up.



Wiper Switch

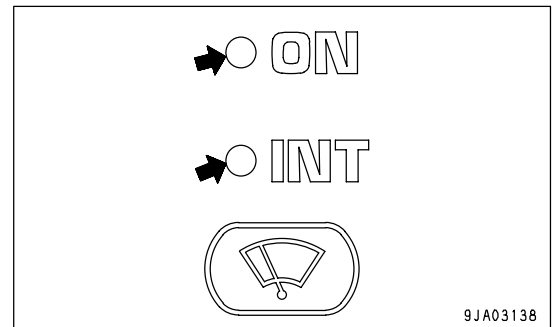
This switch (3) actuates the front window wiper.

ON lights up: The wiper works continuously.

INT lights up: The wiper works intermittently.

OFF: The wiper stops.

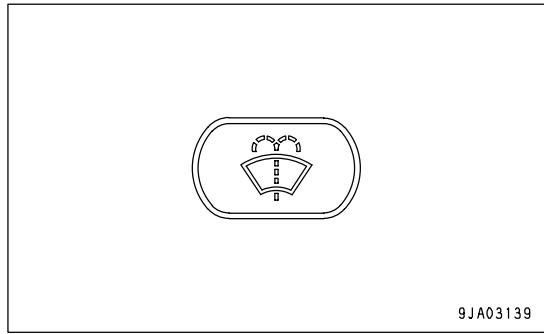
The wiper operation mode is changed in the order of stop → intermittent → continuous → stop, every time the switch is depressed.



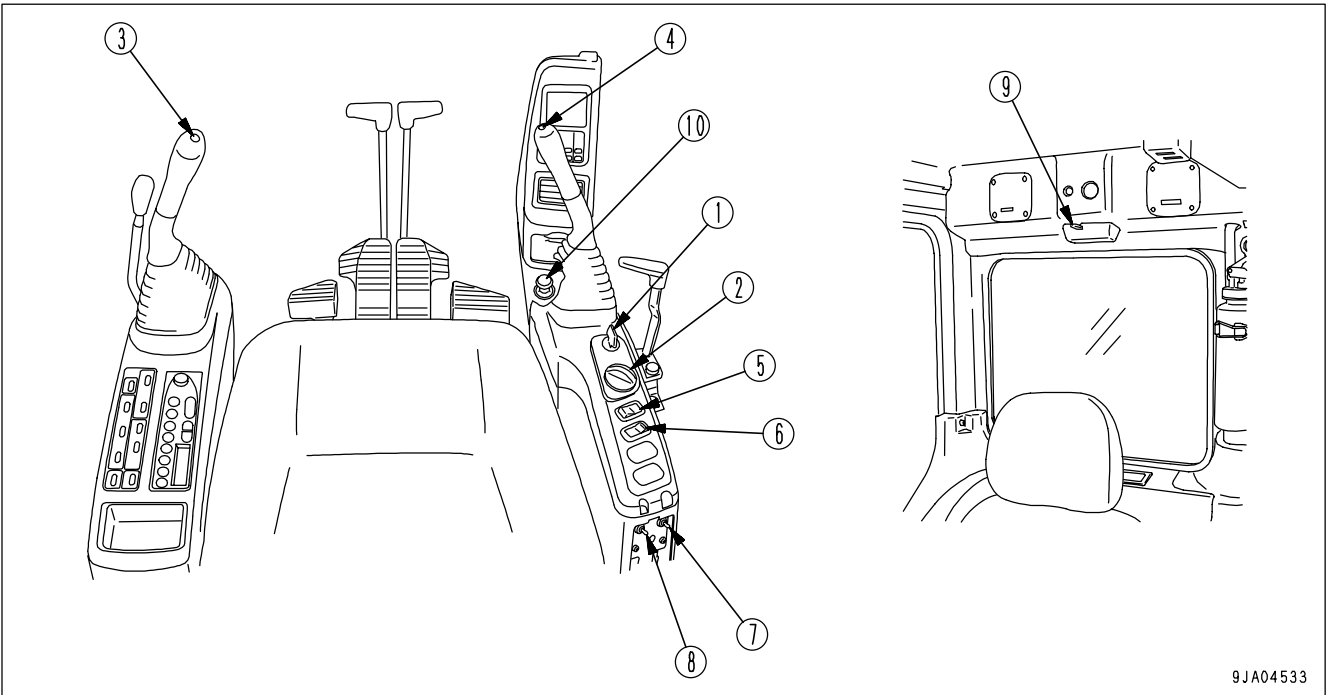
Window Washer Switch

This switch (4) is kept continuously pressed, window washer fluid is sprayed out on the front glass. When the switch is released, the spray stops.

- If switch (4) is kept pressed when the wiper is stopped, the window washer fluid will spray out, and at the same time, the wiper will be actuated continuously. When switch (4) is released, the wiper will continue to operate continuously for 2 cycles, and will then stop.
- If the wiper is moving intermittently and switch (4) is kept pressed continuously, the window washer fluid will spray out, and at the same time, the wiper will be actuated continuously. When switch (4) is released, the wiper will continue to operate continuously for 2 cycles, and will then return to intermittent operation.



SWITCHES



9JA04533

- (1) Starting switch
- (2) Fuel control dial
- (3) Swift deceleration switch
- (4) Horn button
- (5) Lamp switch
- (6) Alarm buzzer stop switch
- (7) Emergency pump drive switch
- (8) Swing brake cancel switch
- (9) Room lamp switch
- (10) Cigarette lighter

Starting Switch

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

OFF position

The key can be inserted or withdrawn. The switches for the electric system except the room lamp and service meter are all turned off and the engine is stopped.

ON position

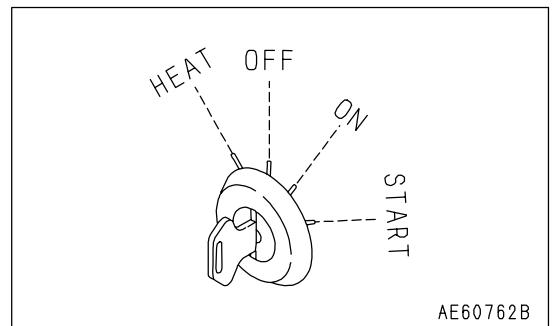
Electric current flows in the charging and lamp circuits. Keep the starting switch key at the ON position while the engine is running.

START position

This is the engine-start position. Keep the key at this position during cranking. Immediately after starting the engine, release the key. It will automatically return to the ON position.

HEAT (preheat) position

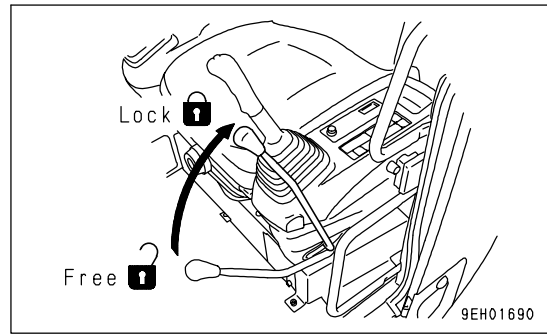
When starting engine in cold weather, set the key to this position. When the key is set to the HEAT position, the pre-heating monitor lights up. Keep the key at this position until the monitor lamp flashes. Immediately after the pre-heating monitor flashes, release the key. The key automatically returns to the OFF position. Then, start the engine by turning the key to the START position.



AE60762B

REMARK

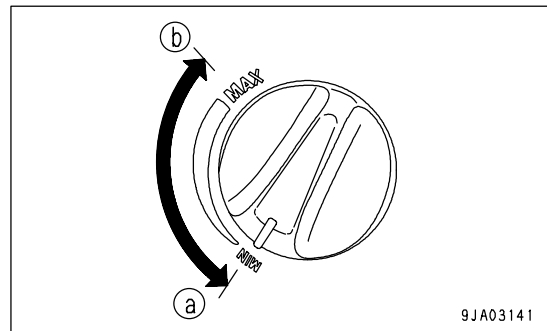
The engine does not start, if the safety lock lever is not in the LOCK position. Make sure first that the safety lock lever is in the LOCK position, and then turn the engine starting switch.



Fuel Control Dial

This dial (2) is used to control engine speed and output.

- (a) Low idling position: The dial is turned to the left (counterclockwise) fully.
- (b) High idling position: The dial is turned to the right (clockwise) fully.



REMARK

When the swift deceleration monitor is lighted up, the engine speed will remain at low idling even if the dial is operated. To restore engine speed, press swift deceleration switch on the left work equipment control lever to cancel the deceleration function.

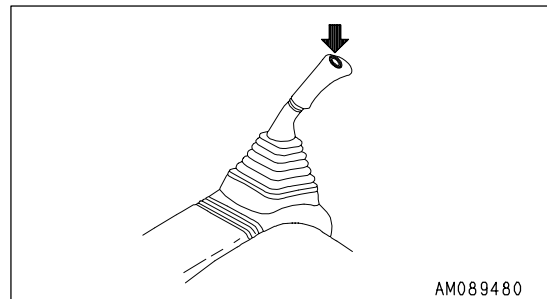
Swift Deceleration Switch

 **WARNING**

Always return the work equipment and travel levers to the neutral position before operating the swift deceleration switch. If the switch is operated when any lever is being operated, the engine torque will suddenly change.

This switch (3) is used to activate the system to lower the engine speed and reduce the fuel consumption when the engine output is not required, such as when the travel levers, travel pedals and work equipment control levers are at the neutral position.

When the swift deceleration switch in the center of the knob of the left work equipment control lever is pressed, the swift deceleration monitor lights up and the engine speed goes down to low idling. When the swift deceleration switch is pressed again, the deceleration monitor goes off, and the engine speed turns to the speed set by the fuel control dial.

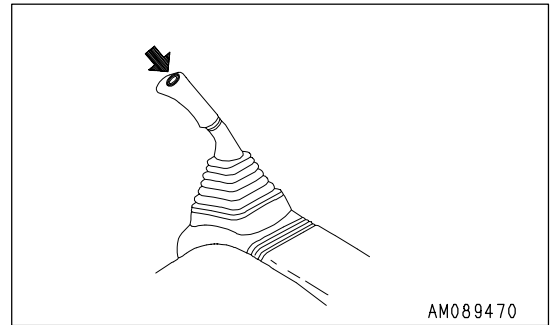


REMARK

- When fuel control dial is at the low idling position, the engine speed will not go down any lower even if this switch is pressed.
- If the engine speed does not rise, it is possible that this switch is ON. Look at the swift deceleration monitor to check the condition of the switch.
- If the starting switch is turned OFF position when the swift deceleration switch is ON, the deceleration function is canceled.

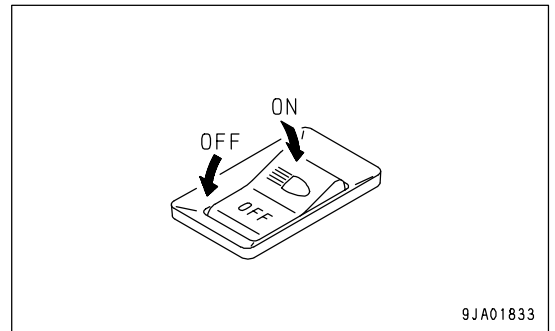
Horn Switch

Press switch (4) at the center of the knob of the right work equipment control lever to sound the horn.



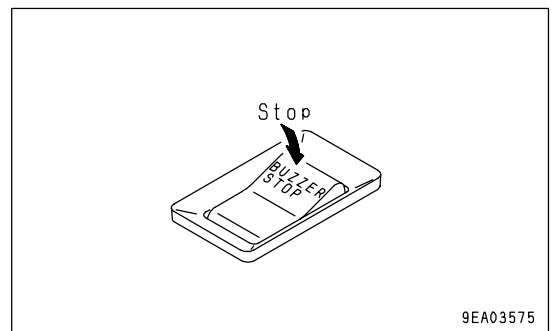
Lamp Switch

This switch (5) lights up the working lamp and monitor illumination.



Alarm Buzzer Stop Switch

This switch (6) is used (when the engine is running) to stop the alarm buzzer when it has sounded to warn of an abnormality in a warning item.



Pump Drive Emergency Switch

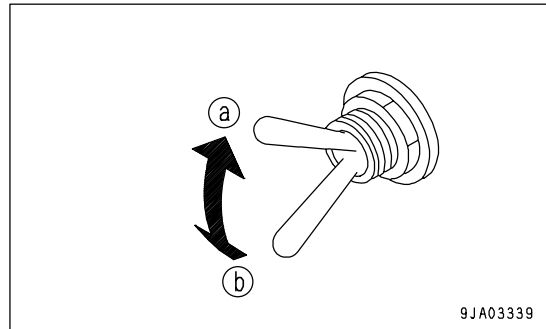
NOTICE

- This switch is installed to make it possible to carry out operation temporarily if any abnormality should occur in the pump control system. It is not intended for permanent use. Repair the cause of the abnormality immediately.
- If this switch is depressed and moved to the EMERGENCY position by mistake, thereby engaging the machine in the work, while the machine is in normal condition, an "E02" mark is shown in the display.
If "E02" is displayed during the work, check that the switch is in the NORMAL position.

This switch (7) is used to make it possible to carry out operations temporarily if any abnormality should occur in the pump control system (when the display shows "E02").

- (a) EMERGENCY: When abnormal (move switch up)
- (b) NORMAL: When normal (move switch down)

If the display shows "E02", move the switch up to make it possible to carry out work.



Swing Brake Cancal Switch

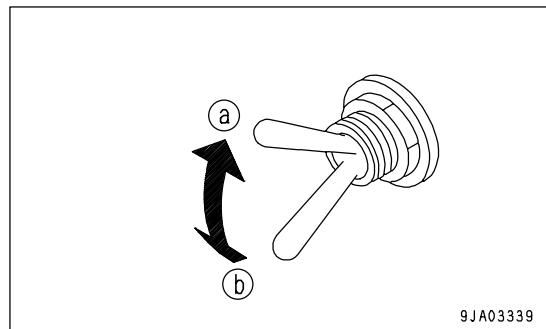
NOTICE

- This switch is installed to make it possible to carry out operation temporarily if any abnormality should occur in the swing brake system. It is not intended for permanent use. Repair the cause of the abnormality immediately.
- If this switch is depressed and moved to the EMERGENCY position by mistake, thereby engaging the machine in the work, while the machine is in normal condition, an "E03" mark is shown in the display.
If "E03" is displayed during the work, check that the switch is in the NORMAL position.

This switch (8) is used to make it possible to carry out operations temporarily if any abnormality should occur in the swing brake system (when the display shows "E03").

- (a) EMERGENCY: When abnormal (move switch up)
- (b) NORMAL: When normal (move switch down)

If the display shows "E03", move the switch up to make it possible to carry out work.



Room Lamp Switch

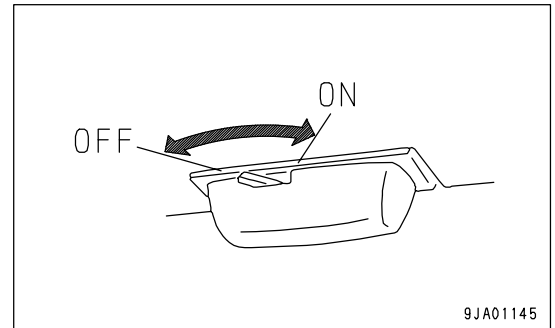
NOTICE

**Be sure to switch the lamp to the OFF position after use.
If the switch is left at the ON position, the battery will run down.**

This switch (9) is used to light up the room lamp.
ON position: Lights up
OFF position: Goes off

REMARK

Even when the engine-starting switch is in the OFF position, the room lamp lights up, so do not forget to turn it off.



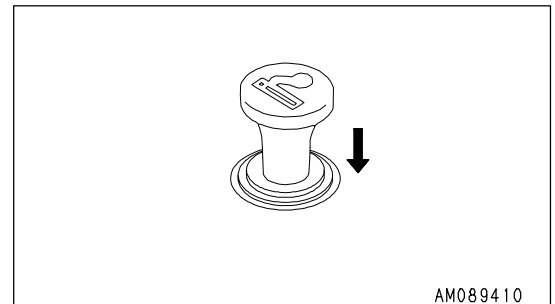
Cigarette Lighter

This switch (10) is used when lighting cigarettes. When the cigarette lighter is pushed in, it will return to its original position after several seconds, so pull it out to use it.
If the cigarette lighter is removed, the socket can be used as a power source.

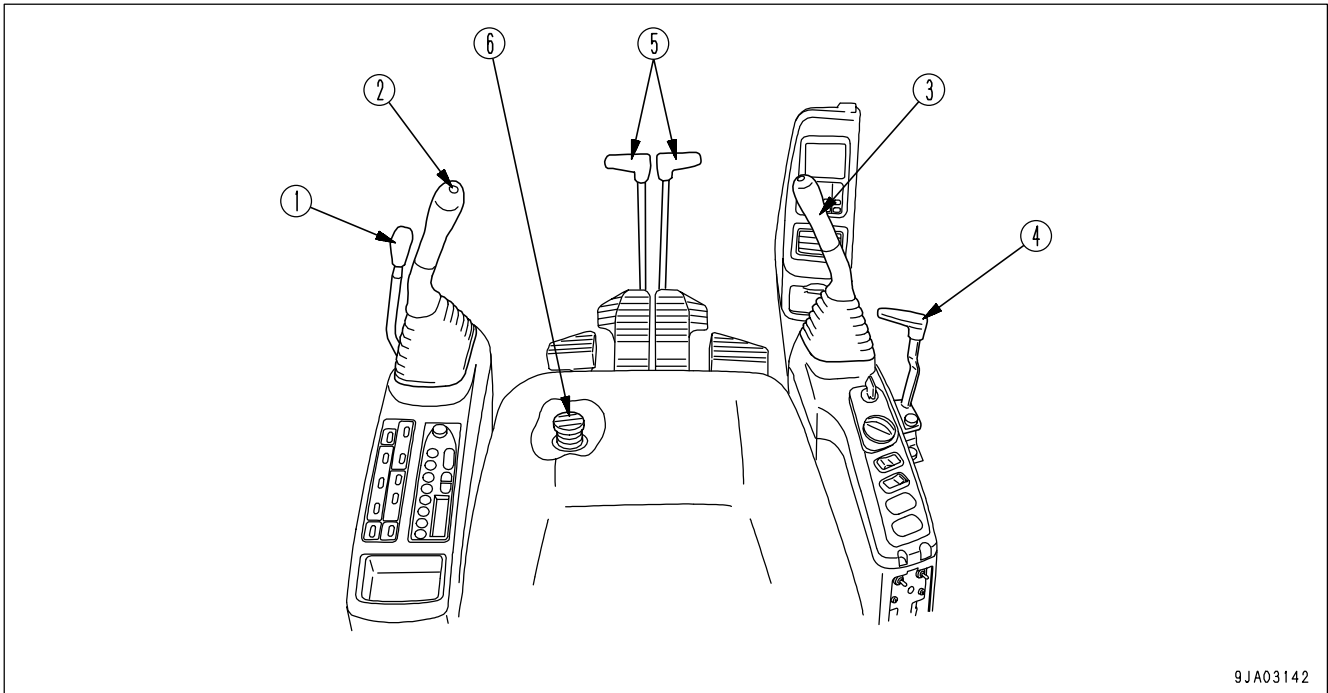
NOTICE

This cigarette lighter is of a 24 V type. Hence do not use this as a power source for electric equipment of 12 V type, otherwise they will likely be damaged.

The capacity of this cigarette lighter is 85 W (24 V X 3.5 A).



CONTROL LEVERS AND PEDALS



9JA03142

- (1) Safety lock lever
- (2) Left work equipment control lever
- (3) Right work equipment control lever
- (4) Blade control lever
- (5) Travel levers (machines with travel pedals)
- (6) Traveling accelerator pedal

Safety Lock Lever

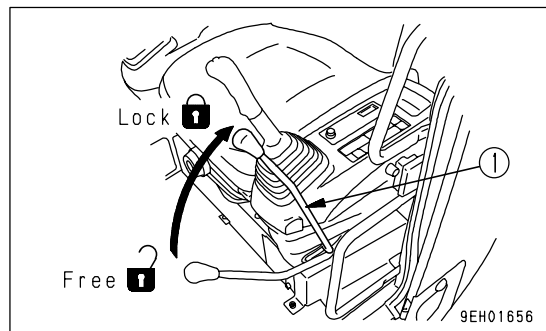
! WARNING

- When leaving the operator's cab, be sure to move the safety lock lever to the LOCK position. If the safety lock lever is not in the LOCK position and a control lever is touched accidentally, that may cause a serious bodily injury.
- If the safety lock lever is not secured in the LOCK position, it may cause a serious bodily injury. Check that the lever is in the illustrated position.
- Be careful not to accidentally touch the work equipment control lever while pulling up the safety lock lever.
- Be careful not to accidentally touch the work equipment control lever while pushing down the safety lock lever.

This lever (1) is a locking device for locking operation of the work equipment and attachments, swing and travel. The lever is put to the LOCK position, when it is pulled up. This safety lock lever is of a hydraulic locking type. Even if it is put to the LOCK position, the work equipment control lever and travel control lever can be moved, but neither machine nor the work equipment moves.

REMARK

The engine does not start, if the safety lock lever is not in the LOCK position. Make sure first that the safety lock lever is in the LOCK position, and then turn the engine starting switch.



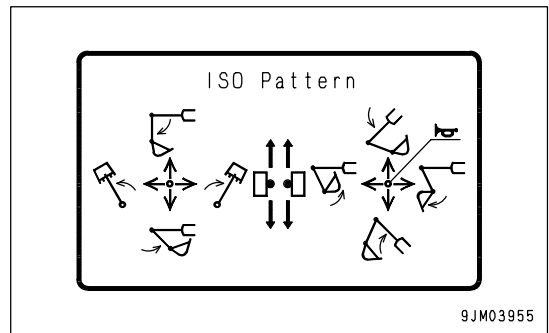
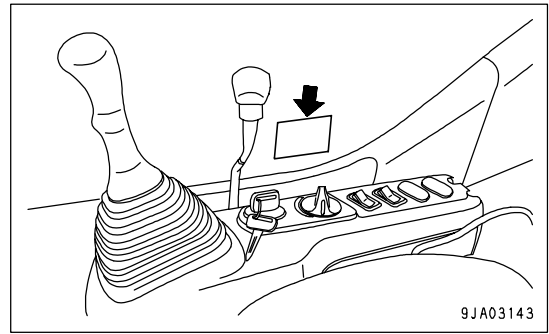
9EH01656

Work Equipment Control Lever

WARNING

- The operating pattern is set to the standard operating pattern (ISO pattern).
- When changing the operating pattern, please contact your Komatsu distributor.
- The method of using operating patterns other than the ISO pattern is given in the ATTACHMENT AND OPTIONS section. Always read and understand the contents before operating the machine.
- When changing the operating pattern, change the operating plate at the same time to the operating plate that matches the movement of the machine.

The place to attach the operating plate is on the right side of the operator's cab.



This left work equipment control lever (2) is used to operate the arm and upper structure.

Swing operation

(a) Swing to right

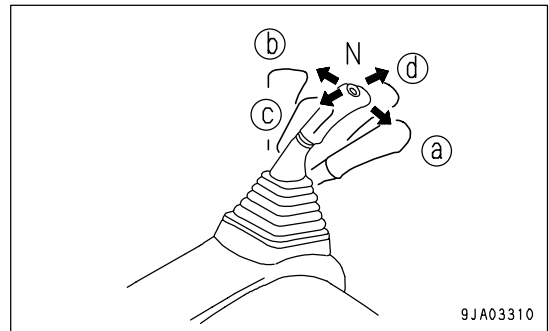
(b) Swing to left

Arm operation

(c) Arm IN

(d) Arm OUT

N (Neutral): The upper structure and arm are held in that position when they come to a stop and do not move.



This right work equipment control lever(3) is used to operate the arm and upper structure.

Boom operation

(e) RAISE

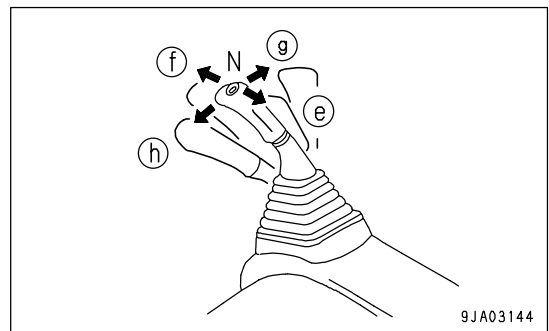
(f) LOWER

Bucket operation

(g) DUMP

(h) CURL

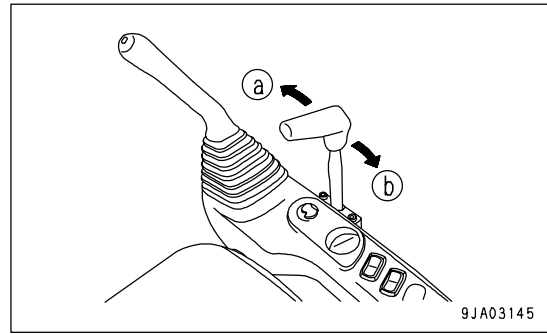
N (Neutral): The boom and bucket are held in that position when they come to a stop and do not move.



Blade Control Lever

This lever (4) is used to control the blade.

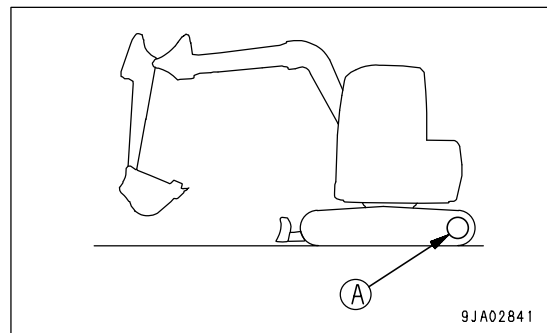
- (a): LOWER
- (b): RAISE



Travel Levers

! WARNING

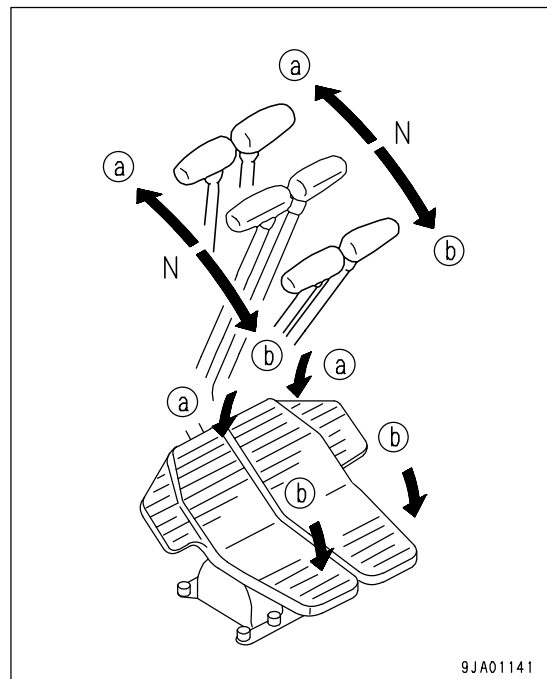
- Do not put your foot on the pedal unless the machine is traveling. If you leave your foot on the pedal and press it by mistake, the machine will move suddenly, and this may lead to a serious accident. Do not rest a foot on the pedal except when traveling or steering the machine, using the pedal.
- If the track frame is facing the rear, the direction of travel operations will be reversed.
When operating the travel levers, check if the track frame is facing the front or the rear.
(If sprocket (A) is at the rear, the track frame is facing the front.)
- Take good care when traveling or steering the machine, using the pedal.



- (): This indicates operation of the pedal.
- (a) FORWARD: This lever is pushed forward
(This pedal is angled forward)
- (b) REVERSE: This lever is pulled back
(The pedal is angled back)
- N (Neutral): The machine stops

REMARK

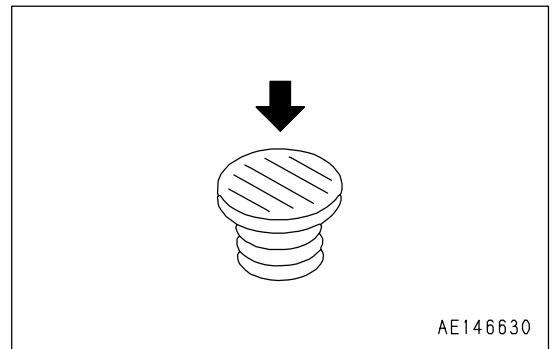
Machines equipped with travel alarm
If the lever is shifted to the advance or reverse position from the neutral position, the alarm sounds to warn that the machine is starting to advance



Traveling Accelerator Pedal

If the pedal (6) is depressed, the machine speed will increase.

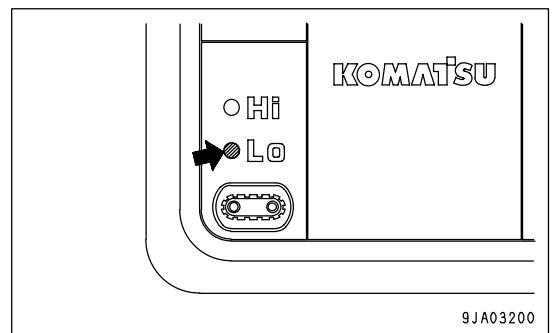
For details of the travel speed values, see "SPECIFICATIONS (PAGE 5-2)".



REMARK

The acceleration pedal works, when the travel speed shifting switch in the monitor panel is at low speed position (Lo lamp lights up).

The travel speed does not change, even if the pedal is depressed, if the switch is at high speed position (Hi lamp lights up).



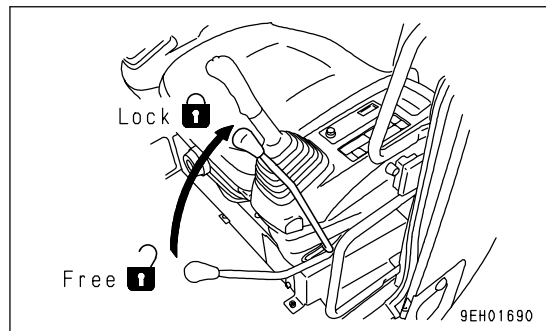
SUN ROOF

WARNING

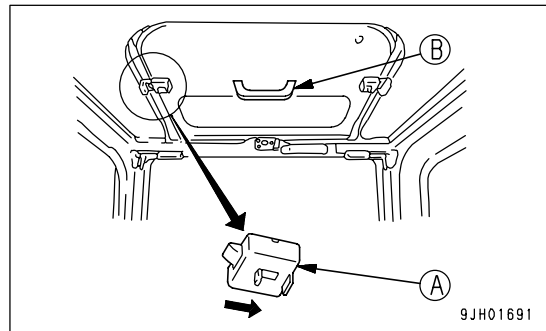
- When leaving the operator's compartment, set the safety lock lever securely to the LOCK position. If the control levers are not locked, and they are touched by mistake, this may lead to a serious accident.
- When opening or closing the roof hatch, carry out the operation on horizontal ground. If you open or close the hatch when the footing conditions are poor, there is danger that you may fall.

Opening

1. Set the safety lock lever securely to the LOCK position.



2. Release lock (A) provided on both side of the ceiling and check that it moves freely. Then push it up to open, holding handle (B).



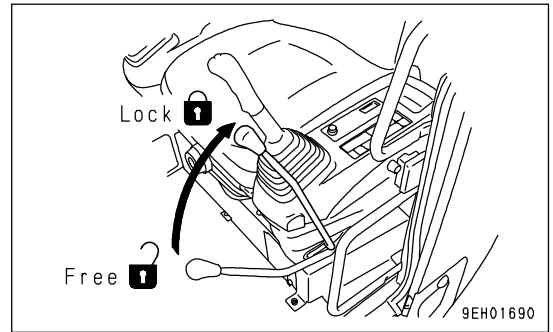
Closing

Pull the ceiling down, holding handle (B) and set locks (A). If the locks do not engage properly, open the ceiling once again and try to shut it.

WINDSHIELD

**WARNING**

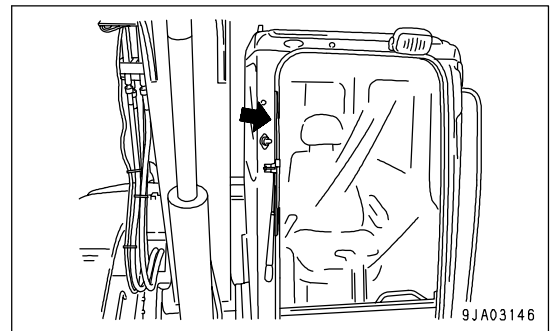
- When opening or closing the front window, bottom window, or door, always set the safety lock lever to the LOCK position. If the control levers are not locked and they are touched by accident, this may lead to a serious accident.
- When opening or closing the window at the front of the cab, stop the machine on horizontal ground, lower the work equipment completely to the ground, stop the engine, then carry out the operation.
- When opening the front window, hold the grip securely with both hands, pull up, and do not let go until the automatic lock catch is locked.
- When closing the front window, hold the handle with your both hands and close it firmly.



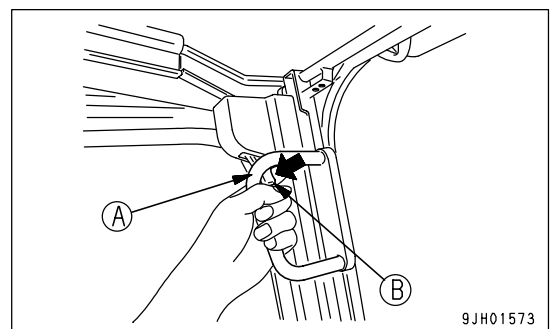
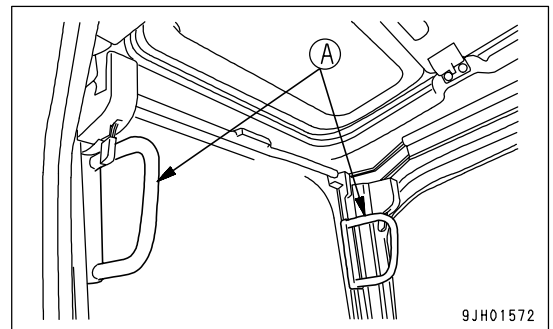
It is possible to stow (pull up) the front window in the roof of the operator's compartment.

Opening

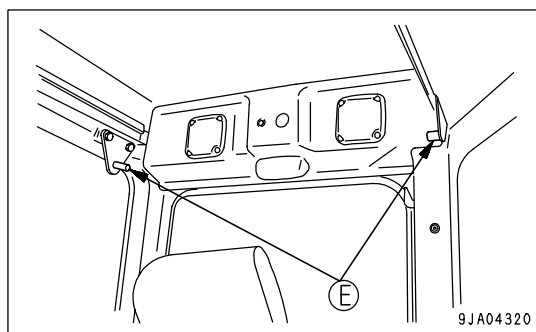
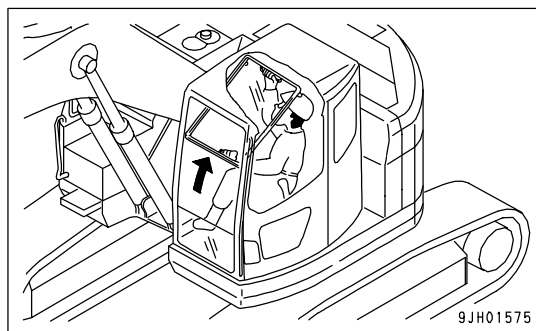
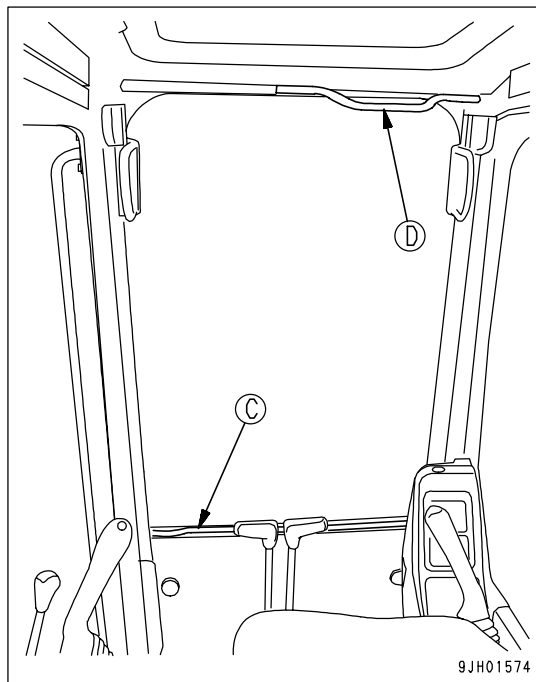
1. Stop the machine on level ground, lower the work equipment completely to the ground, then stop the engine.
2. Set the safety lock lever securely to the LOCK position.
3. Check that the wiper blade is stowed in the right stay.



4. Grip handles (A) at the top right and left of the front window, and pull lock lever (B) toward yourself to release the lock at the top of the front window. The top of the front window will come out.

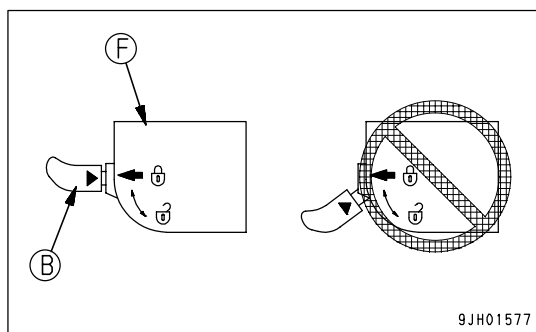


5. Hold lower handle (C) with your left hand from inside the operator's cab, and with your right hand, grip top handle (D), pull it up, and push it against lock catch (E) at the rear of the cab securely to lock the window.



6. Check that lock lever (B) is securely at the LOCK position.

- The lock is engaged if the arrow on lock case (F) matches the position of the arrow on lock lever (B). Check visually.
- If the arrow on lock case (F) does not match the position of the arrow on lock lever (B), the lock is not engaged. Repeat the operation in Step 5 to engage the lock.



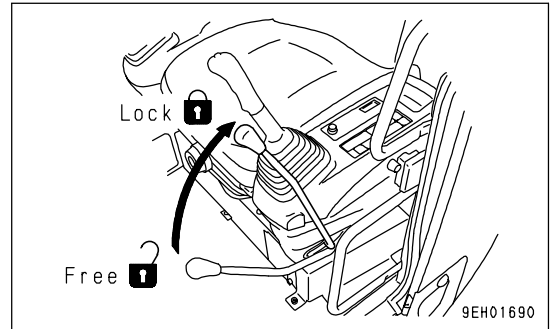
Closing



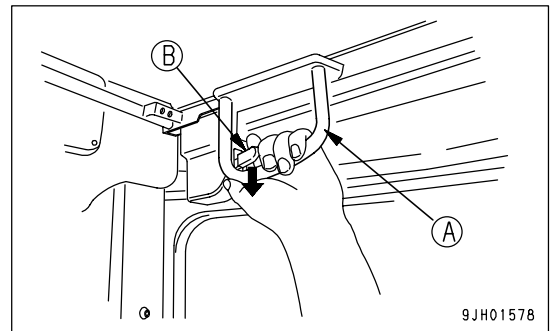
WARNING

When closing the window, lower it slowly and be careful not to get your hand caught.

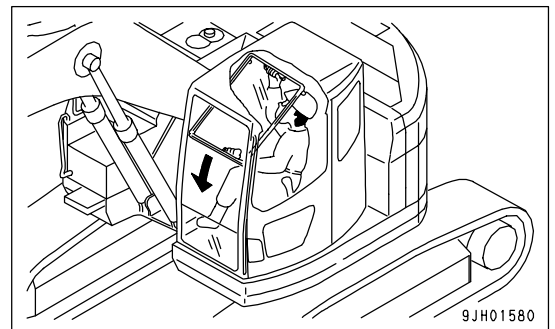
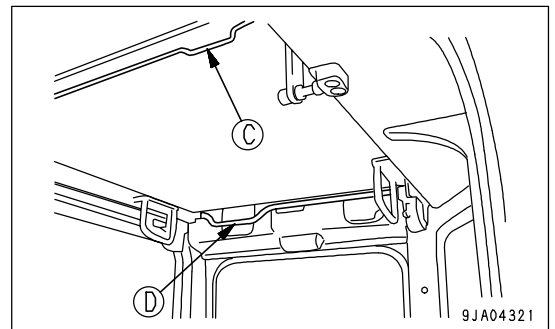
1. Stop the machine on level ground, lower the work equipment completely to the ground, then stop the engine.
2. Set the safety lock lever securely to the LOCK position.



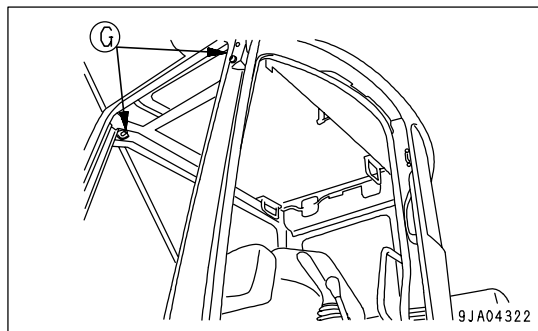
3. Grip left and right handles (A), and pull down lock lever (B) to release the lock.



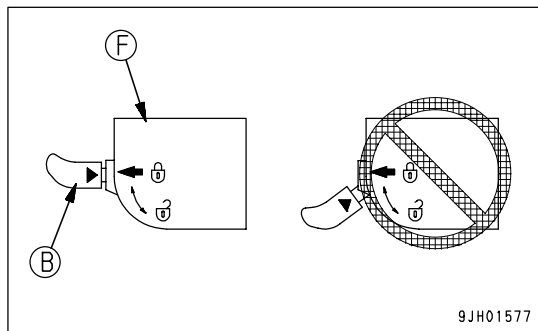
4. Grip handle (C) at the bottom of the front window with your left hand and handle (D) at the top with your right hand, push to the front, then lower slowly.



- When the bottom of the window reaches the top of the bottom window, push the top of the window to the front to push it against left and right lock catches (G) and engage the lock.

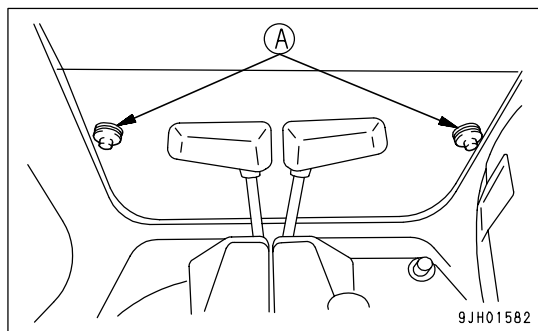


- Check that lock lever (B) is securely at the LOCK position.
 - The lock is engaged if the arrow on lock case (F) matches the position of the arrow on lock lever (B). Check visually.
 - If the arrow on lock case (F) does not match the position of the arrow on lock lever (B), the lock is not engaged. Repeat the operation in Step 5 to engage the lock.

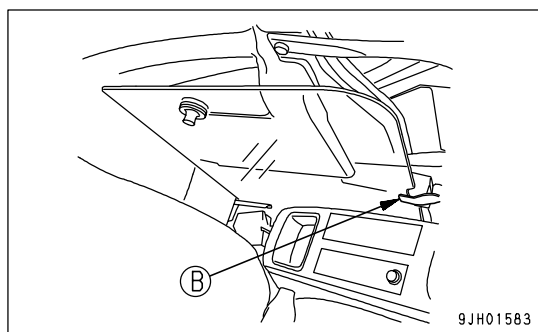


Removing Lower Windshield

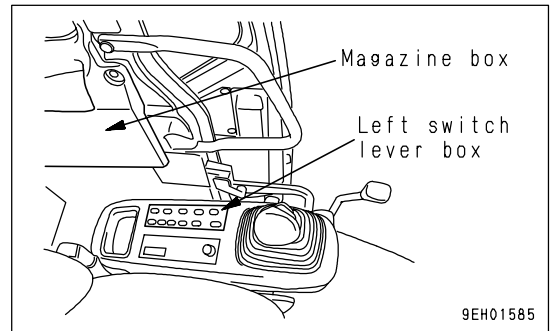
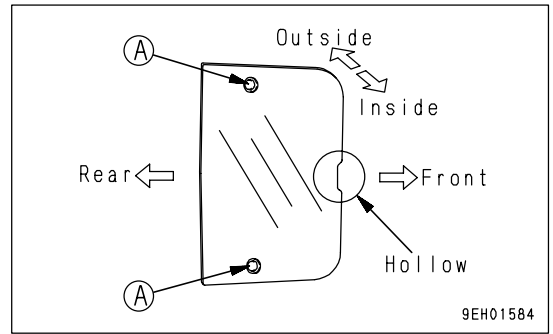
- Open the front window, then hold grip (A), pull up, and remove the bottom window.



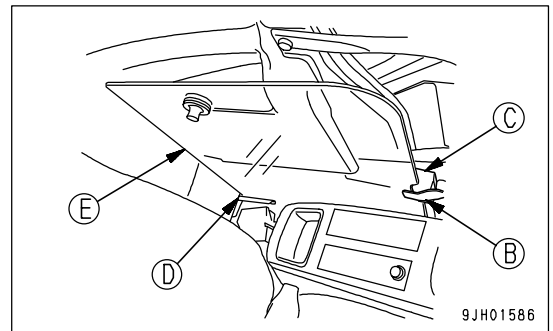
- After removing the bottom window, stow it on the inside left of the operator's cab, then lock securely in position with lock lever (B). The procedure for stowing is as follows.



- 1) Set the hollow in the glass at the front face, set the protruding part of grip (A) on the inside, and insert between the left switch lever box and magazine box on the inside left of the operator's cab.

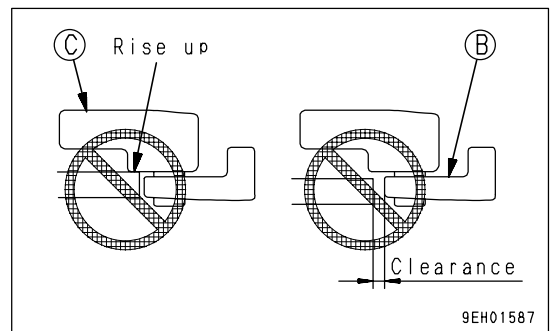


- 2) After inserting into groove (D) of the bottom frame rubber and rear frame rubber (A), push the bottom window against lock base (C).

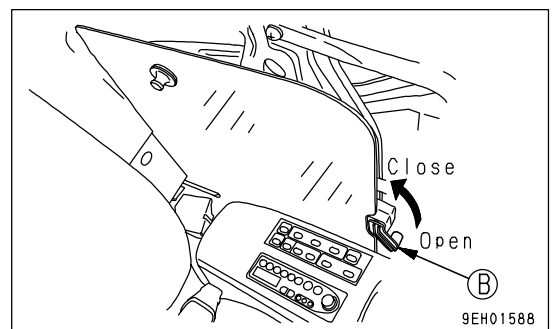


NOTICE

If the window rise up on lock base (C) or is not in contact with lock lever (B), and it is attempted to engage the lock by force, there is danger that the glass may break. Check before applying the lock.



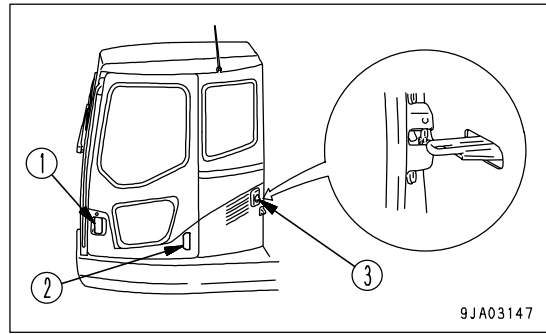
- 3) Set lock lever (B) to the LOCK (CLOSED) position.



SLIDING DOOR

! CAUTION

- Be sure to check that the sliding door is locked in position both when it is open and when it is closed.
- Always stop the machine on level ground when opening or closing the door.
If the door is opened or closed on a slope, there is danger that the operating effort will suddenly change. Do not open or close the door on slopes.
- When opening or closing the door, always use door handle (1) and knob (2).
- Be careful not to get your hands caught between the front pillar or center pillar.
- If there is anyone inside the cab, call out to that person before opening or closing the door.



9JA03147

Door Lock

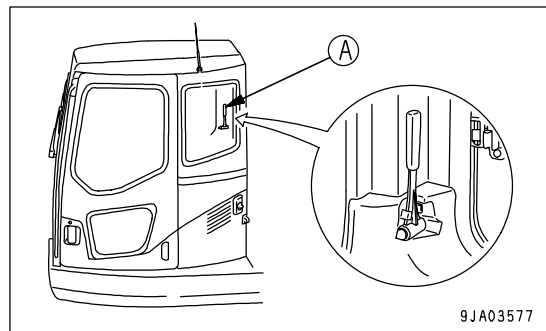
When closing the door, pull the handle back to remove lock (3), then pull the door to the front.

EMERGENCY ESCAPE HAMMER

! CAUTION

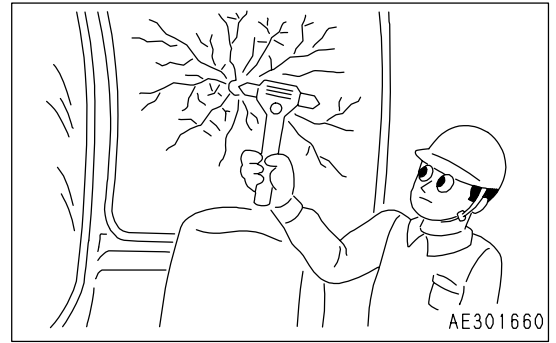
- When you are obliged to break the window glass pane with a hammer, take good care not to get hurt with flying glass shards. Before getting out of the operator's cab, remove glass fragments remained in the windowsills not to get hurt with them. Moreover watch your step not to slip over the broken glasses scattered on the ground.
- To prevent injury from pieces of glass, remove all the broken glass from the window frame. Be careful also not to slip on the broken glass that has fallen to the ground.

If it should become impossible to open the cab door for any reason, and it is necessary to make an emergency escape from the operator's compartment, use hammer (A) to escape.



9JA03577

To escape from the operator's cab, use hammer (A) to break the glass and escape through the window.

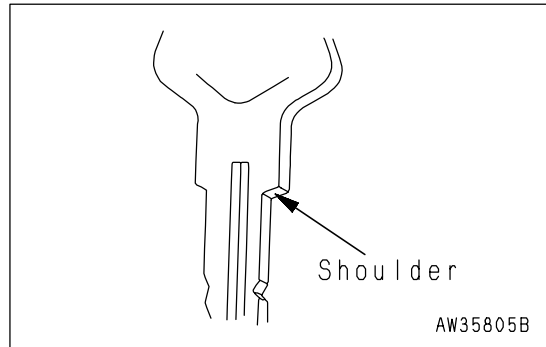


CAP WITH LOCK

Use the starting key to open and close the locks on the caps and covers.

For details of the locations of the caps and covers with locks, see "LOCKING (PAGE 3-102)".

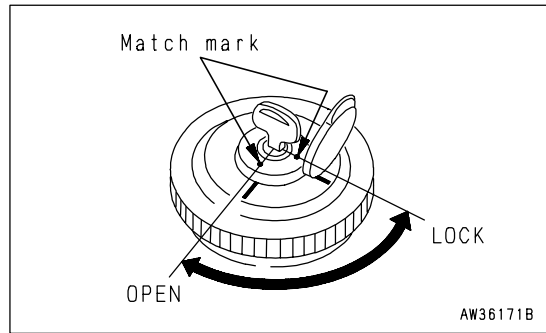
Insert the key as far as it will go, then turn it. If the key is turned before it is inserted fully, it may break.



Opening and Closing Caps with Lock

Opening the Cap

1. Insert the key into the key slot.
2. Turn the key clockwise, align the key slot with the match mark on the cap, then open the cap.



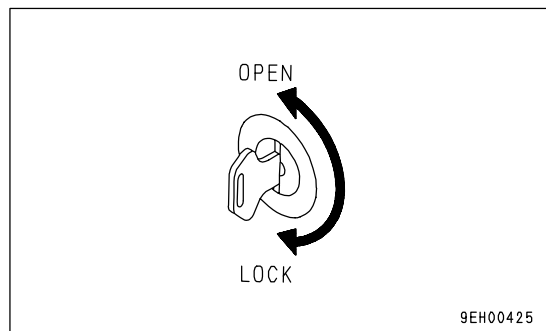
Locking the Cap

1. Turn the cap until tight, then insert the key into the key slot.
2. Turn the key counterclockwise and take the key out.

Opening and Closing Covers with Lock

Opening the Cover

1. Insert the key into the key slot.
2. Turn the key counterclockwise and open the cover by pulling the cover grip.



Locking the Cover

1. Close the cover and insert the key into the key slot.
2. Turn the key clockwise and take the key out.

ENGINE HOOD

**WARNING**

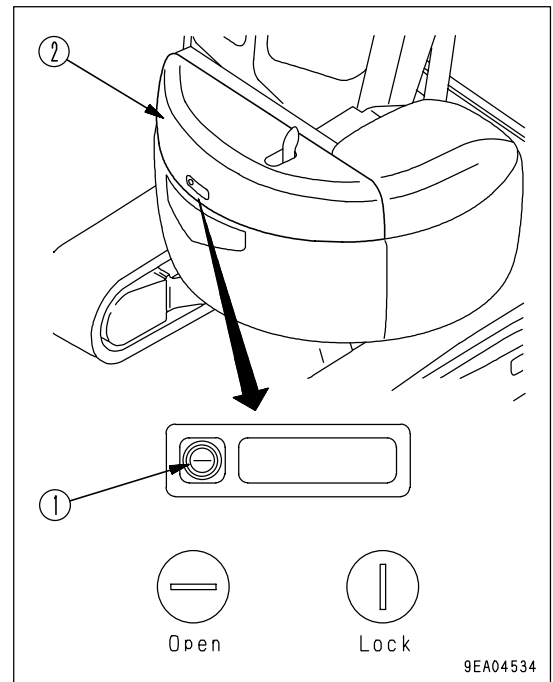
- Never attempt to climb on the engine hood. There is the danger that you may slip off.
- When carrying out inspection and maintenance inside the engine hood, always use the hood support lever to hold the engine hood open.

NOTICE

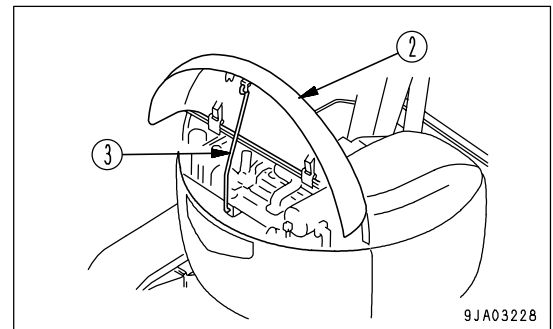
Always keep the hood locked except when opening it.

Check the direction of the key slot in the opening knob to check that it is locked.

1. Release lock (1) of the engine hood.
(For details see "Opening and Closing Covers with Lock (PAGE 3-32)".)
2. Push engine hood opening knob (1) and open hood (2).



3. After opening the hood, use hood support lever (3) to secure the hood in position.
4. When closing hood (2), remove hood support lever (3), fit it securely in the lever lock, then lower the hood slowly and push it down to lock it.



MUD COVER

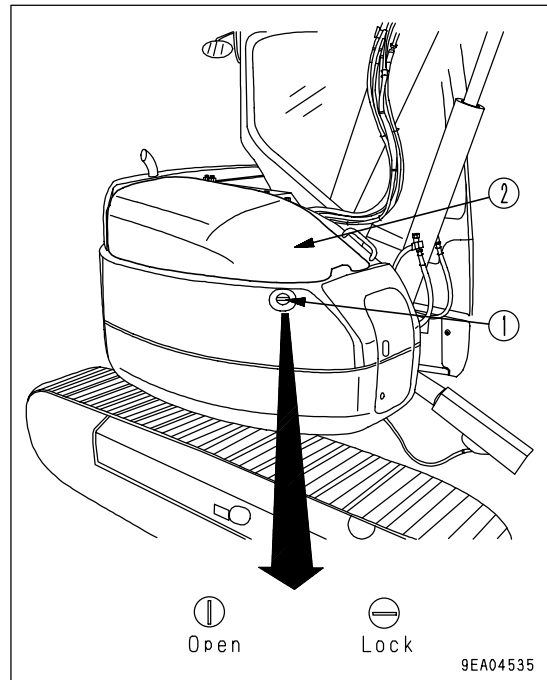
WARNING

- Never attempt to climb on the cover. There is the danger that you may slip off.
- When carrying out inspection and maintenance inside the cover, always use the cover support lever to hold the cover open.

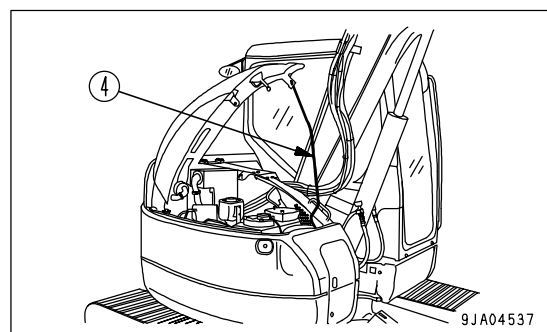
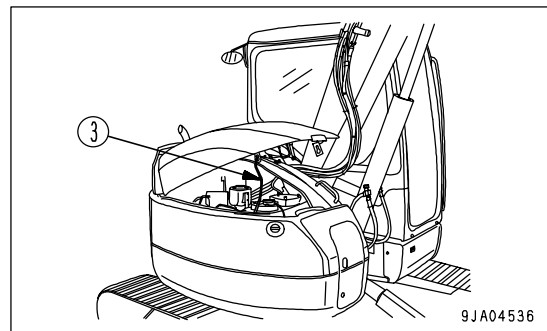
NOTICE

Always keep the hood locked except when opening it.
Check the direction of the key slot in the opening knob to check that it is locked.

1. Release lock (1) of the mud cover.
(For details see "Opening and Closing Covers with Lock (PAGE 3-32)".)
2. Push mud cover opening knob (1) and open cover (2).



3. It can be secured in 2 positions by using cover support lever (3) or (4).
After opening cover (2), set cover support lever (3) or (4) to the LOCK position to hold the cover in position.
4. When closing cover (2), remove cover support lever (3) or (4), fit it securely in the lever lock, then lower the cover slowly and push it down to lock it.



BATTERY INSPECTION COVER

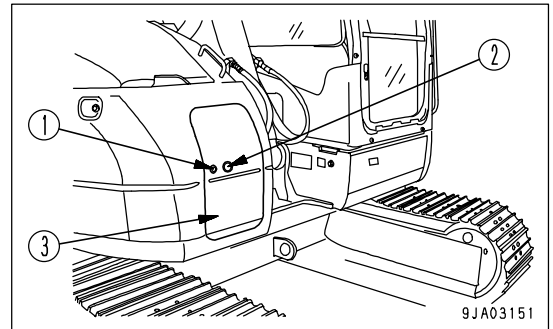
**CAUTION**

When carrying out inspection and maintenance inside the cover, always use the cover support lever to hold the cover open.

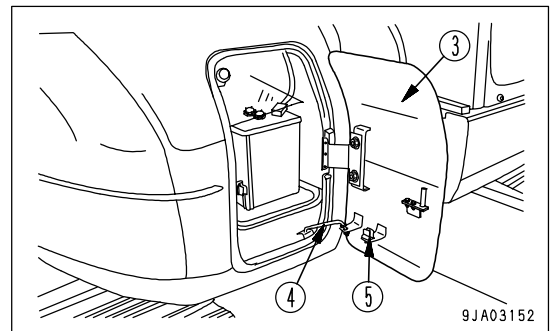
NOTICE

Always keep the door locked except when opening it.

1. Release lock (1) of door.
(For details see "Opening and Closing Covers with Lock (PAGE 3-32)".)
2. Put a finger in hook (2) and pull cover (3) open.



3. To open cover (3), pull it toward yourself, then detach cover support lever (4) from spring catcher (5) and push it in the frame hole.
4. To close cover (3), lift up cover support lever (4), fix it to spring catcher (5) and close it.
5. Do not forget to lock the door.



FUSE

NOTICE

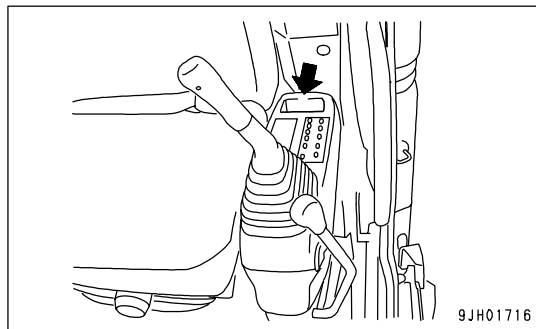
Before replacing a fuse, be sure to turn off the starting switch.

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.

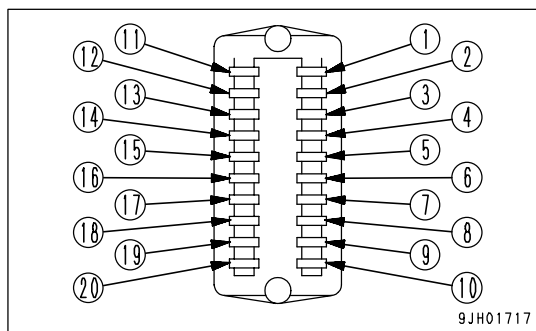
Replace the fuse with another of the same capacity.

- The fuse box is provided behind the left console box.



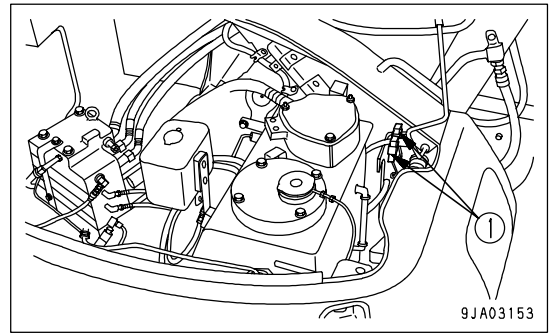
Fuse Capacities and Circuit Names

No.	Fuse capacity	Name of circuit
(1)	10A	Controller
(2)	10A	Pump solenoid free
(3)	10A	Revolving lamp, auxiliary electric power
(4)	10A	Window washer, cigarette lighter
(5)	5A	Horn
(6)	15A	Working lamp
(7)	10A	Radio
(8)	25A	Air conditioner, Heater
(9)	15A	Fuel governer control
(10)	5A	Swing brake cancel
(11)	10A	Deceleration switch controller
(12)	10A	Spare
(13)	10A	Monitor panel
(14)	10A	PPC oil pressure lock solenoid
(15)	15A	Key stop solenoid
(16)	5A	Radio back up
(17)	10A	Air conditioner back up
(18)	10A	Monitor, KOMTRAX
(19)	5A	Room lamp
(20)	30A	Starting switch (B)



FUSIBLELINK

If power is not supplied even after turning the engine starting switch ON, fusible link (1) is suspected of disconnection. In that case, open up the dust cover on the right side of the machine, check and replace it if necessary.



REMARK

A fusible link refers to the large-sized fuse wiring installed in the high current flow portion of the circuit to protect electrical components and wiring from burning, in the same way as an ordinary fuse.

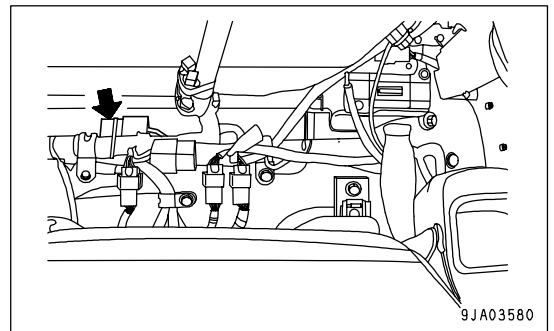
AUXILIARY ELECTRIC POWER

NOTICE

When installing electrical not supplied by Komatsu, use 24 V specifications with a maximum of 600 W (equivalent to 25 A). If equipment is to be installed with a capacity greater than this, please contact your Komatsu distributor.

An optional connector (No. K17) is fastened to a cable with an adhesive tape at the rear part of the cab's floor. This is for taking out power for optional electrical equipment made by other than Komatsu.

If use of such electrical equipment becomes necessary, use the connector after peeling the tape off.



The connector types are shown in the table below.

	X type housing (2-terminal)		Terminal	
	Body	Rear holder	AVS 0.5 - 1.25	AVS 2 - 3
Komatsu part No.	08055-00212	08055-00230	08055-00040	08055-00041

REMARK

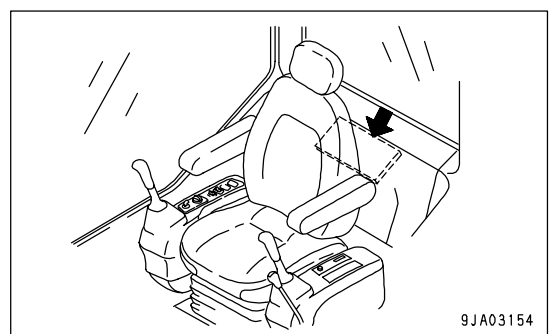
Power may be sourced from the cigarette lighter, too. For the details, see the section of "Cigarette Lighter (PAGE 3-19)" in this manual.

CONTROLLERS

NOTICE

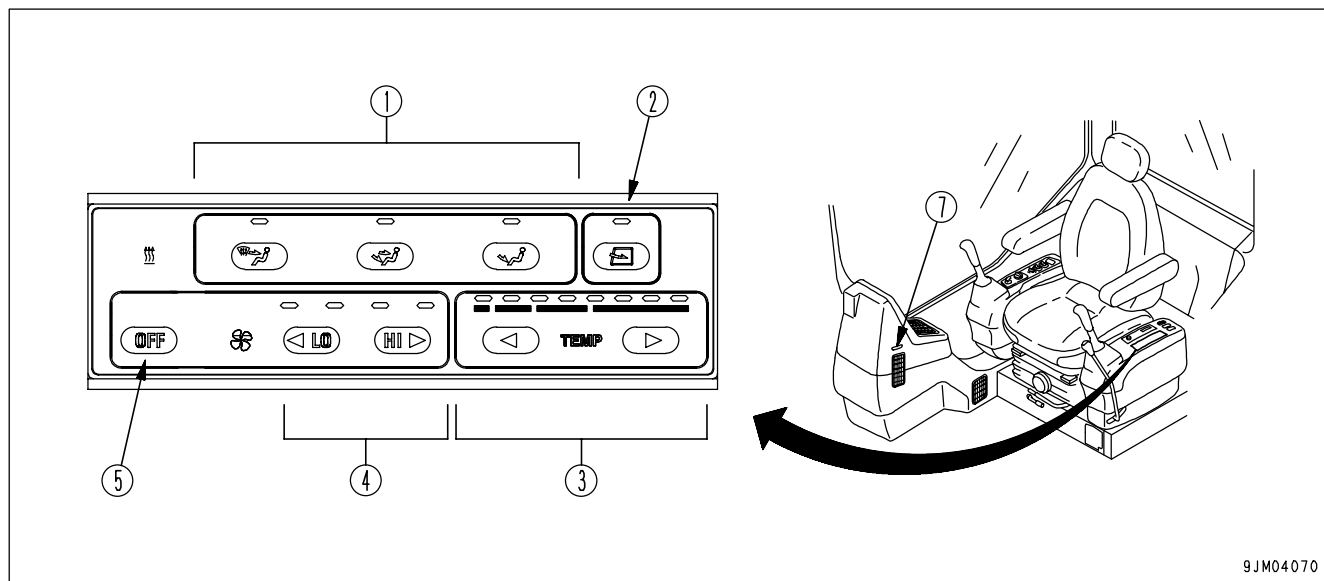
- Do not let water, mud, or juice spill on the controller. This will cause failures.
- If any abnormality occurs in the controller, do not repair it by yourself. Please contact your Komatsu distributor for repairs.

The controller is installed behind the operator's seat.



HEATER AND DEFROSTAR CONTROLS

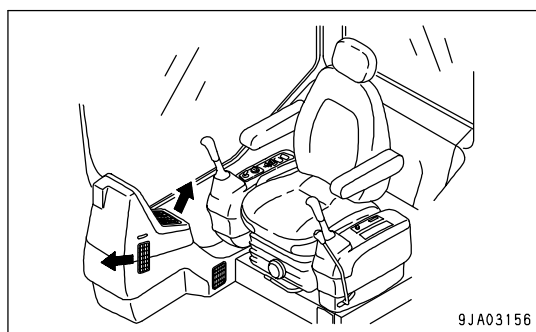
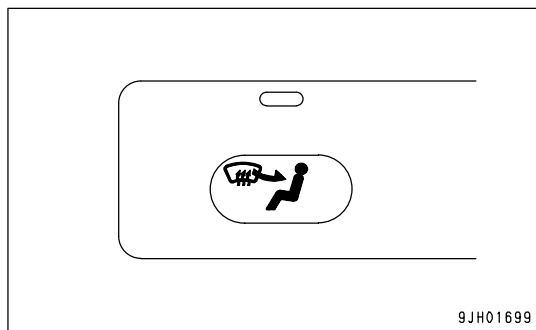
Heater and Defroster Control Panel



- (1) Vent selector switch
- (2) FRESH/RECIRC selector switch
- (3) Temperature control switch
- (4) Air flow selector switch
- (5) OFF switch
- (6) Defroster selector lever

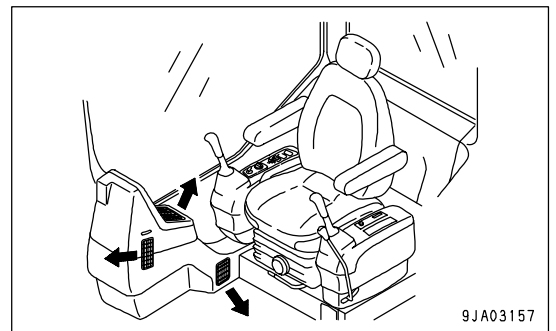
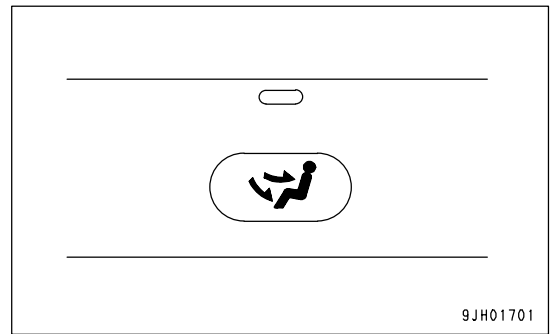
Vent Selector Switch (Sending Air to Face)

If this switch (1) is pressed, the air from the heater is all directed to the face.



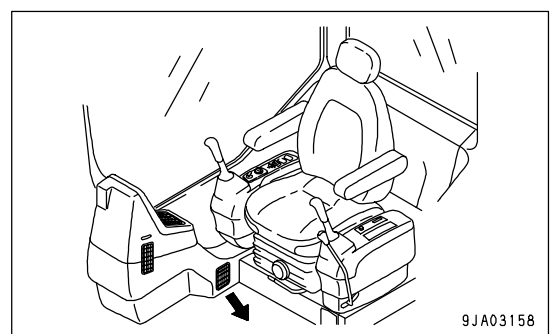
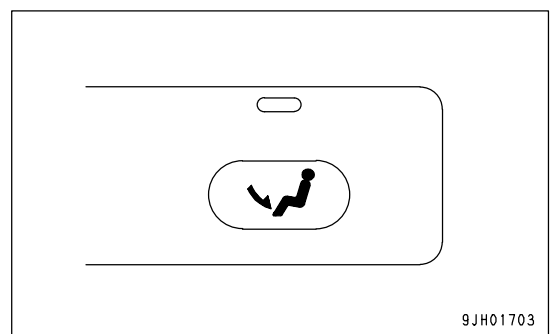
Vent Selector Switch (Sending Air to Face and Feet)

If this switch (1) is pressed, the air from the heater is directed to the face and feet.



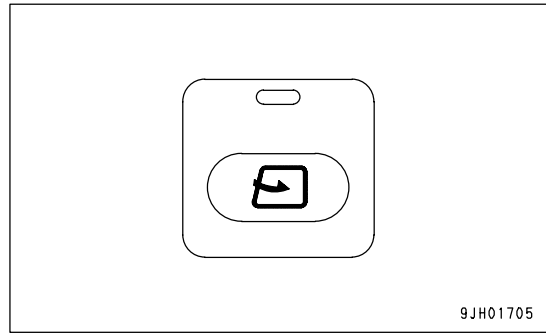
Vent Selector Switch (Sending Air to feet)

If this switch (1) is pressed, the air from the heater is all directed to the feet.



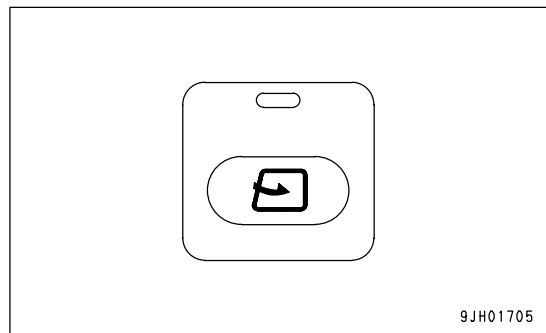
FRESH/RECIRC Selector Switch (Fresh)

When switch (2) is pressed, fresh air is taken into the cab during heating. This position is used to bring in clean fresh air into the cab or to remove the mist from the cab windows.



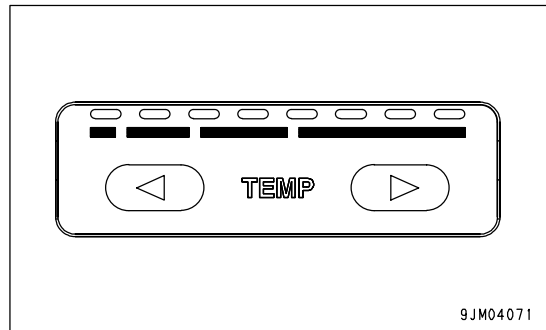
FRESH/RECIRC Selector Switch (Recirculate)

When switch (2) is pressed, the air inside the cab is recalculated and no fresh air is taken in from outside. This position is used when heating the cab quickly or when the outside air is dirty.



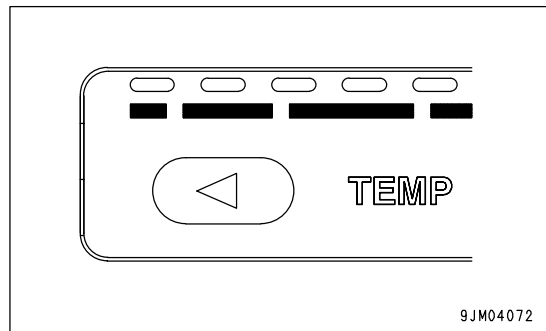
Temperature Control Switch

The closer to the left end the lighting-up is in the range, the lower the room temperature is. Conversely the closer to the right end the lighting-up is in the range, the higher the room temperature is. The indicator range is divided into 11 levels, but within each range the temperature changes sleeplessly.



Temperature Control Switch (Cool)

Use switch (3) to reduce the temperature. Press this switch to reduce the temperature of the air sent from the heater. The more times the switch is pressed, the lower the blowing wind temperature becomes, as the indicator light moves to the left.

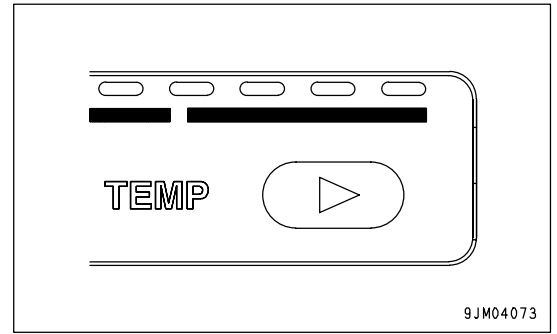


Temperature Control Switch (Warm)

Use switch (3) to increase the temperature.

Press this switch to increase the temperature of the air sent from the heater.

The more times the switch is pressed, the upper the blowing wind temperature becomes, as the indicator light moves to the right.

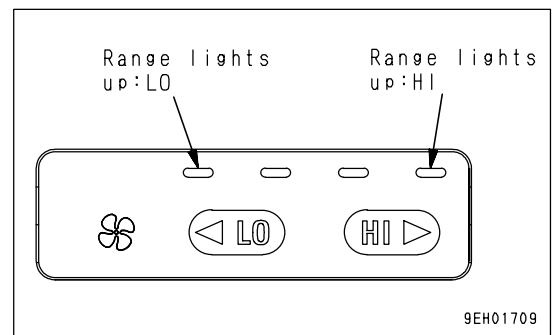


Air Flow Selector Switch

The further it is moved into the LO range (rear of machine), the smaller the air flow becomes; the further it is moved into the HI range (front of machine), the greater the air flow becomes.

The range is divided into 4 levels.

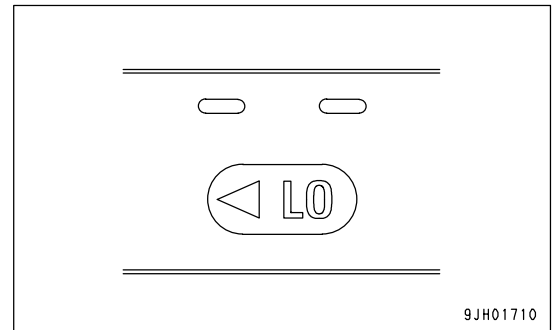
Switch (4) is used to switch the heater functions ON.



Air Flow Selector Switch (Lo)

Switch (4) is used to set the flow of air from the heater to Low.

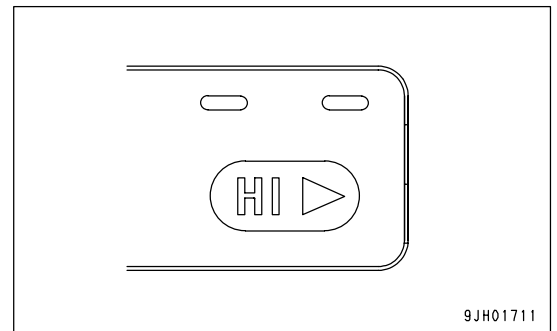
Press this switch to reduce the air flow. The further it is moved into the LO range (rear of machine), the smaller the air flow becomes.



Air Flow Selector Switch (Hi)

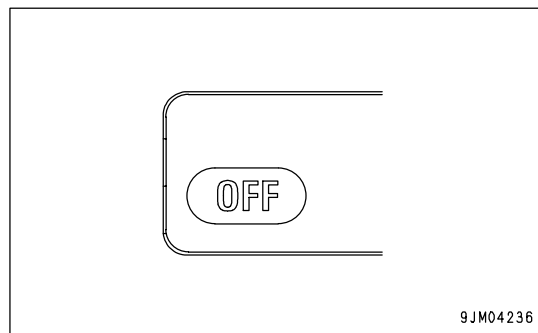
Switch (2) is used to set the flow of air from the heater to High.

Press this switch to increase the air flow. The further it is moved into the HI range (front of machine), the greater the air flow becomes.



Off Switch

Switch (5) is used to stop operation of heater function.



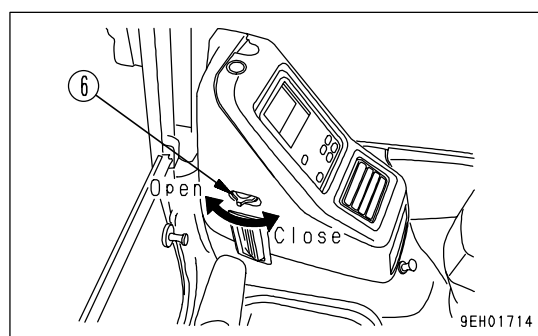
Defroster Selector Lever

Switch (6) is used to remove the mist from the front glass during cold or rainy weather.

Selector lever to front: To defroster (open)

Selector lever to rear: Closed

The defroster can be used when the vent selector switch is set to send air to the face or to the face and the feet.



Precautions When Using Air Conditioner

Ventilate the Cab From Time to Time When Using the Heater

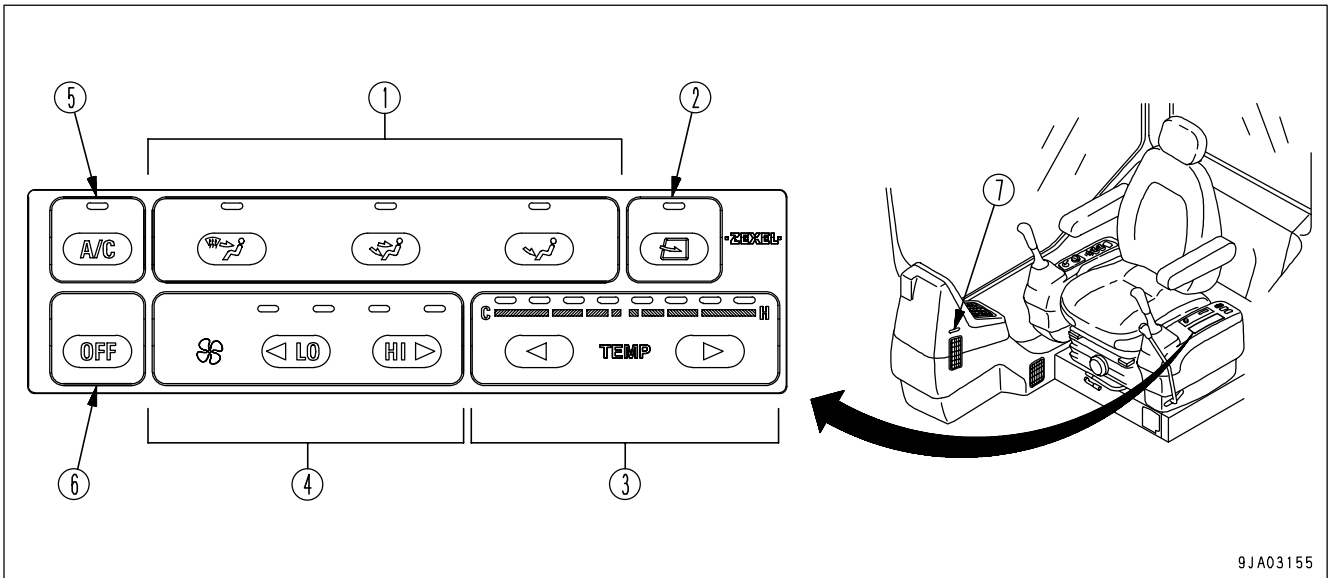
- If you smoke when the heater is on, the smoke may start to hurt your eyes, so open the window and carry out ventilation and heating for a short time to remove the smoke.

When running the heater for a long time, carry out ventilation and cooling together once an hour.

AIR CONDITIONER CONTROLS

(If equipped)

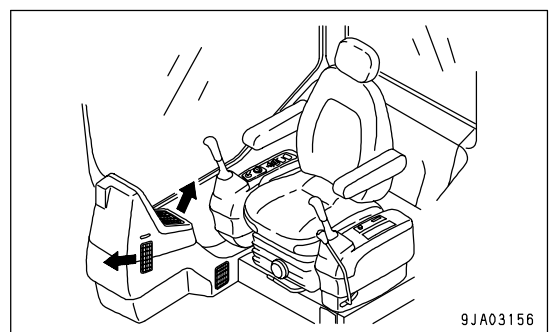
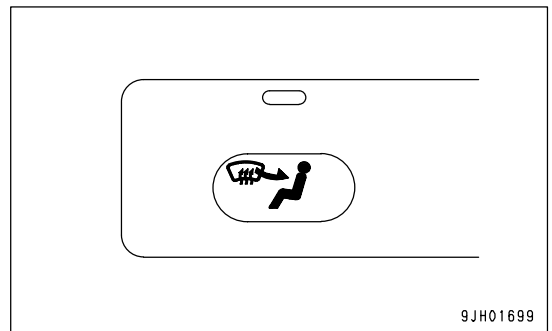
Air Conditioner Control Panel



- (1) Vent selector switch
- (2) FRESH/RECIRC selector switch
- (3) Temperature control switch
- (4) Air flow selector switch
- (5) Air conditioner switch
- (6) Off switch
- (7) Defroster selector lever

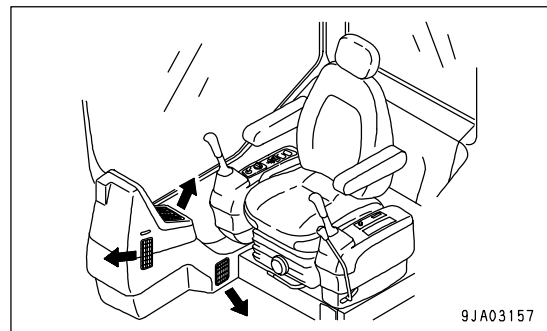
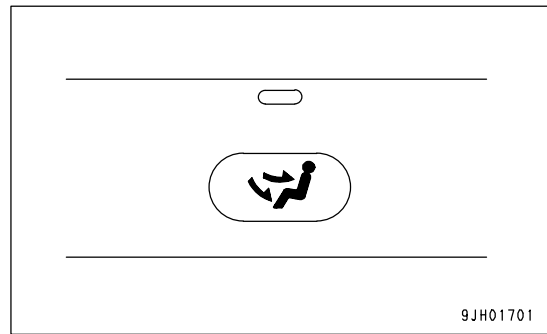
Vent Selector Switch (Air Flow to Upper Part of Body)

If this switch (1) is pressed, the air from the air conditioner is all directed to the face. This can be used to send a cool breeze to the face during hot weather.



Vent Selector Switch (ir Flow to Upper Part of Body and foot)

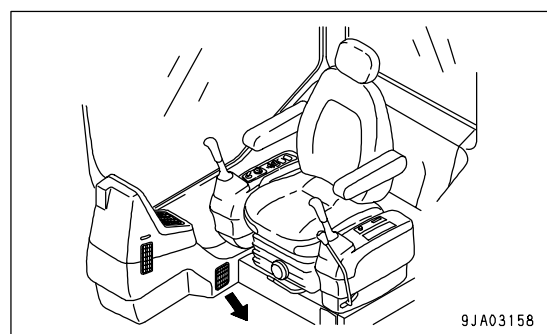
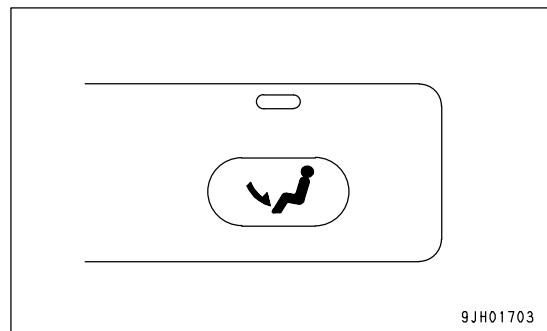
If this switch (1) is pressed, the air from the air conditioner is directed to the face and feet.



Vent Selector Switch (Air Flow to Foot)

If switch (1) is pressed, the air from the air conditioner is all directed to the feet.

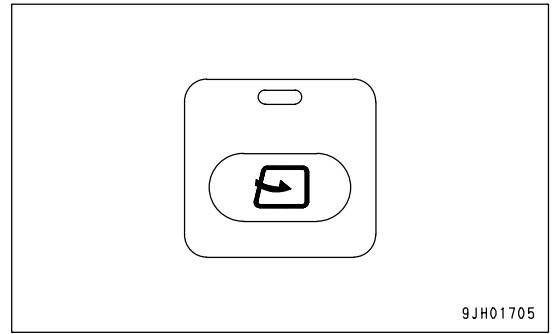
This can be used to send warm air to the feet during cold weather.



Air Circulation Selector Switch (External Air Circulation)

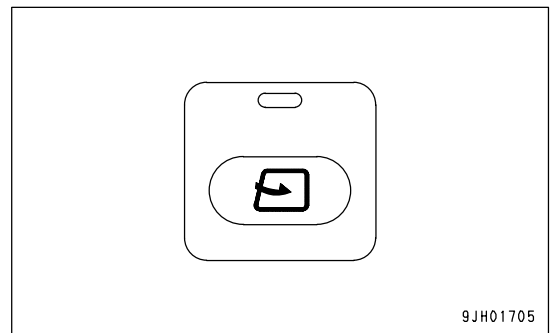
When switch (2) is pressed, fresh air is taken into the cab during heating or cooling.

This position is used to bring in clean fresh air into the cab or to remove the mist from the cab windows.



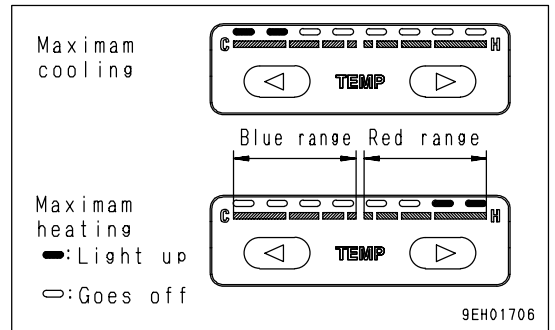
Air Circulation Selector Switch (Internal Air Circulation)

When switch (2) is pressed, the air inside the cab is recirculated and no fresh air is taken in from outside. This position is used when heating or cooling the cab quickly or when the outside air is dirty.



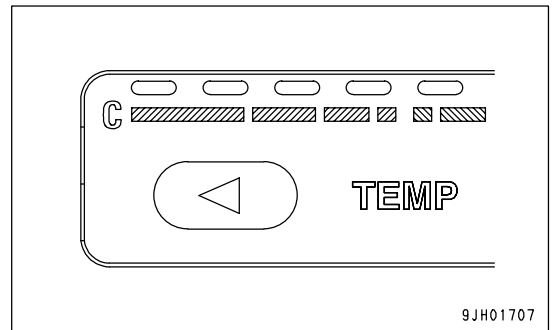
Temperature Control Switch (Cooling)

The closer to the "C" mark the lighting-up is in the range, the lower the room temperature is. Conversely the closer to the "H" mark the lighting-up is in the range, the higher the room temperature is. The indicator range is divided into 11 levels, but within each range the temperature changes sleeplessly.



Use switch (3) to reduce the temperature. Press this switch to reduce the temperature of the air sent from the air conditioner.

The more times the switch is pressed, the lower the blowing wind temperature becomes, as the indicator light moves to the "C".

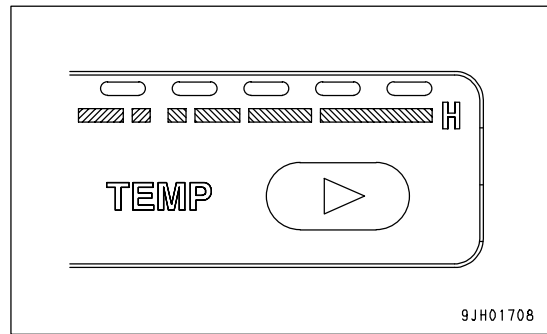


Temperature Control Switch (Heating)

Use switch (3) to increase the temperature.

Press this switch to increase the temperature of the air sent from the air conditioner.

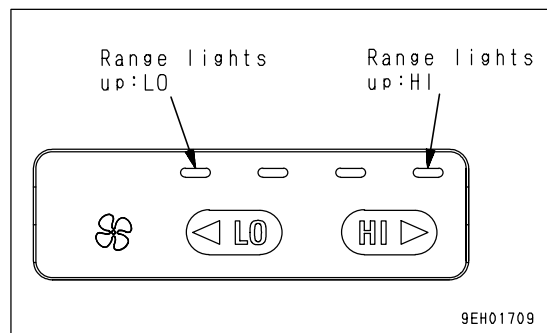
The more times the switch is pressed, the lower the blowing wind temperature becomes, as the indicator light moves to the "H".



Aie Flow Selector Switch

The further it is moved into the LO range (rear of machine), the smaller the air flow becomes; the further it is moved into the HI range (front of machine), the greater the air flow becomes.

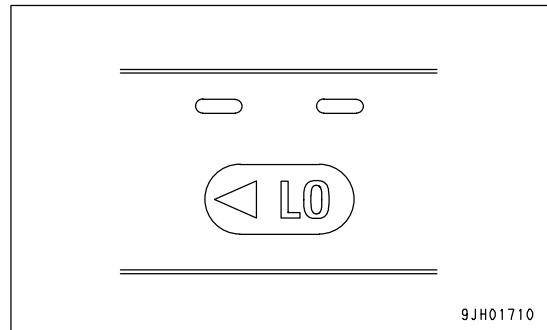
The range is divided into 4 levels.



Air Flow Selector Switch (Low)

Switch (4) is used to set the flow of air from the air conditioner to Low.

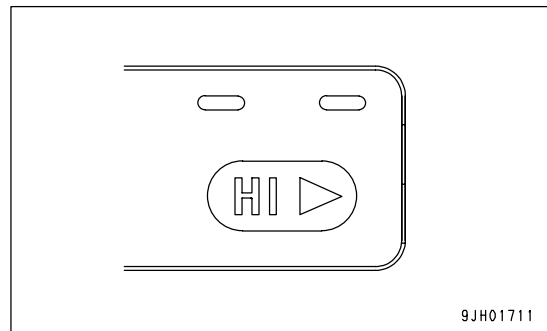
Press this switch to reduce the air flow. The further it is moved into the LO range (rear of machine), the smaller the air flow becomes.



Air Flow Selector Switch (High)

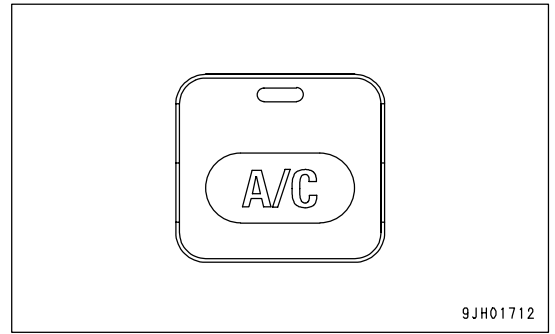
Switch (2) is used to set the flow of air from the air conditioner to High.

Press this switch to increase the air flow. The further it is moved into the HI range (front of machine), the greater the air flow becomes.

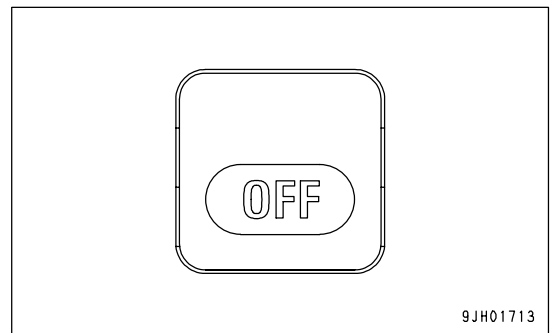


Air Conditioner Switch

Switch (5) is used to switch the air conditioner functions ON/OFF.

**Off Switch**

Switch (6) is used to stop operation of the fan.

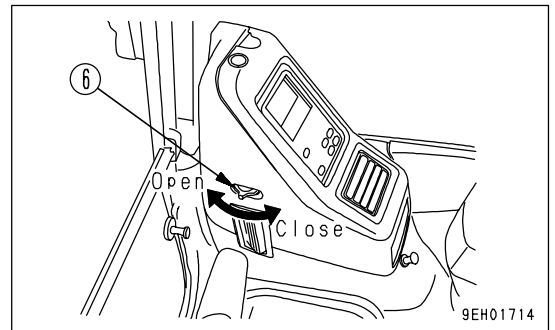
**Defroster Selector Lever**

Switch (7) is used to remove the mist from the front glass during cold or rainy weather.

Selector lever to front: To defroster (open)

Selector lever to rear: Closed

The defroster can be used when the vent selector switch is set to send air to the face or to the face and the feet.

**Use Air Conditioner With Care****Ventilation**

- If you smoke when the cooler is on, the smoke may start to hurt your eyes, so open the window and turn the lever to FRESH for a while to remove the smoke while continuing the cooling.

When running the air conditioner for a long time, turn the lever to the FRESH position once an hour to carry out ventilation and cooling.

Temperature Control

- When the cooler is on, set the temperature so that it feels slightly cool when entering the cab (5 to 6°C (41 to 42.8 °F) lower than the outside temperature). This temperature difference is considered to be the most suitable for your health, so always be careful to adjust the temperature properly.

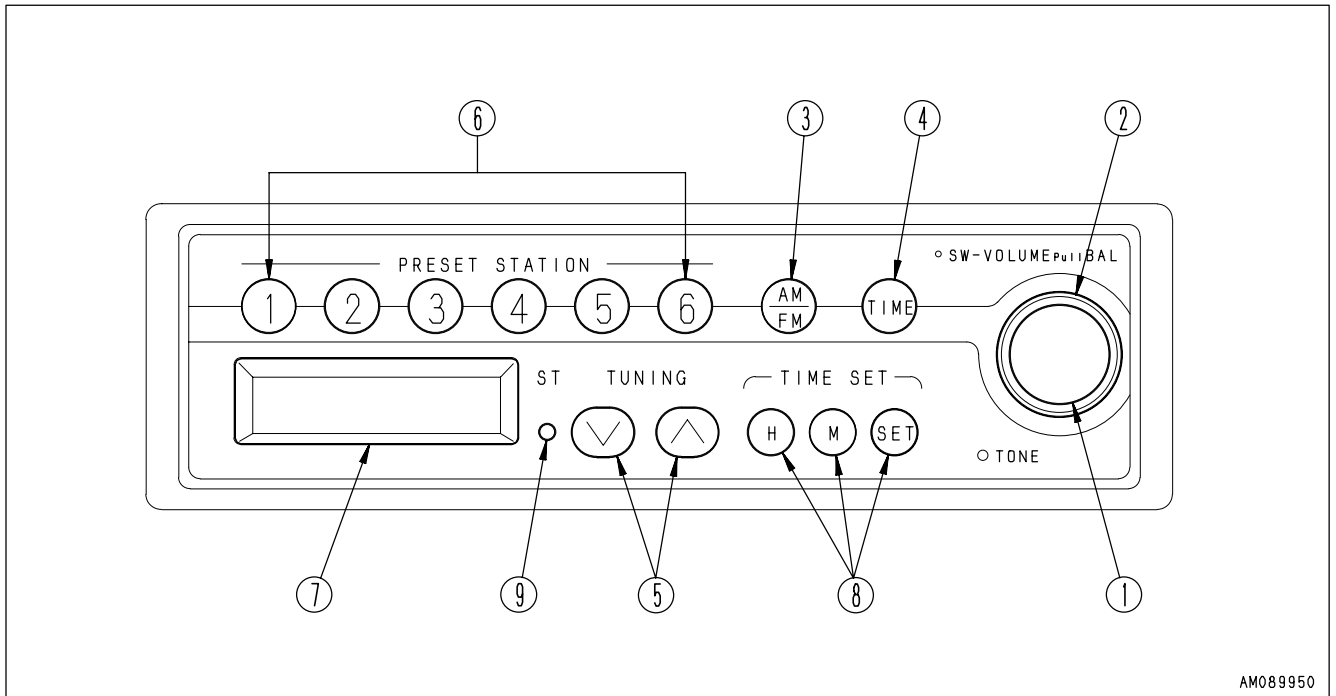
Air Conditioner Maintenance

When carrying out inspection and maintenance of a machine equipped with air conditioner, see "INITIAL 250 HOURS MAINTENANCE (ONLY AFTER THE FIRST 250 HOURS) (PAGE 4-16)".

RADIO

(If equipped)

Control Panel



- | | |
|---|---|
| (1) Power switch/volume control (SW-VOLUME) and Balance (Pull BAL) Knob | (5) Manual tuning button (TUNING) |
| (2) Tone control knob (TONE) | (6) Preset station buttons (1, 2, 3, 4, 5, 6) |
| (3) FM/AM selection button (AM/FM) | (7) Display |
| (4) Display selection button (TIME) | (8) Time reset button |
| | (9) Stereo indicator (ST) |

Power Switch/Volume Control (SW-VOLUME) and Balance (Pull BAL) Knob

Press this knob (1) to turn the power for the radio on. The frequency is displayed on display (7). Press again to turn the power off.

Turn the knob to adjust the volume as follows.

Turn **CLOCKWISE** to **INCREASE** volume

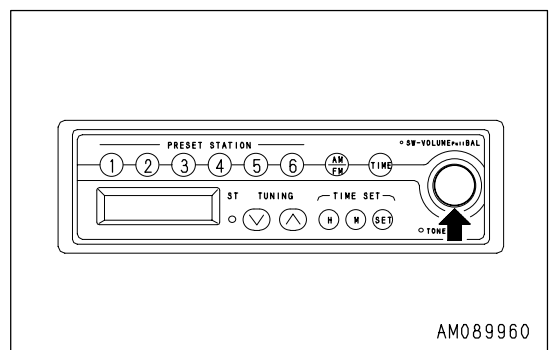
Turn **COUNTERCLOCKWISE** to **REDUCE** volume

If the knob is pulled until it locks, it can be turned to the left or right to adjust the balance of the left and right speakers.

Turn **CLOCKWISE** to increase volume from **RIGHT** speaker

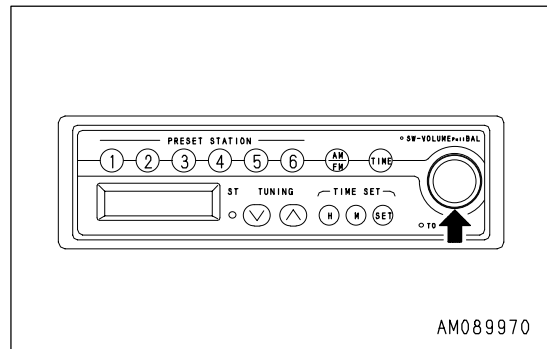
Turn **COUNTERCLOCKWISE** to increase volume from **LEFT** speaker

After adjusting the left and right balance, press lightly to return the knob to its original position. (If it is left pulled out, the overall volume cannot be adjusted.)



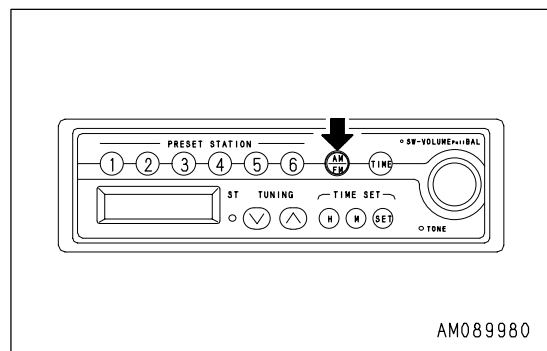
Tone Control Knob (TONE)

Turn the knob(2) to adjust the tone as follows.
 Turn CLOCKWISE to emphasize the high sounds.
 Turn COUNTERCLOCKWISE to suppress the high sounds.



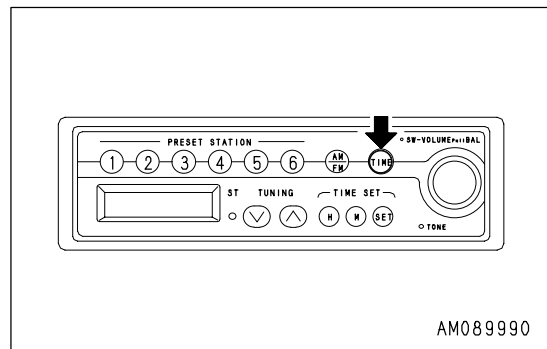
FM/AM Selection Button (AM/FM)

Press this button(3) and select the desired band.
 Each time the button is pressed, it switches AM → FM → AM ...



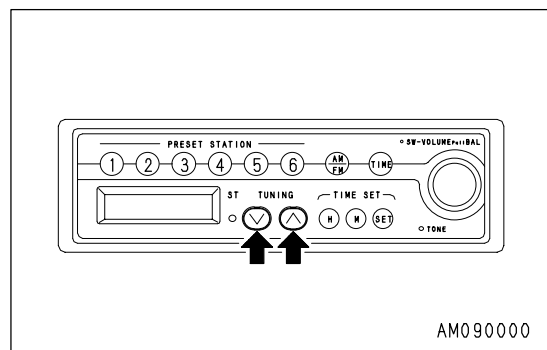
Display Selection Button (TIME)

This equipment gives priority to the frequency display. If the button (4) is pressed when the frequency is displayed, display will give the present time for 5 seconds. After 5 seconds pass, the display will automatically return to the frequency display. If any button other than TIME SET (H, M, SET) is pressed within the 5 seconds, the display will return to the frequency display.



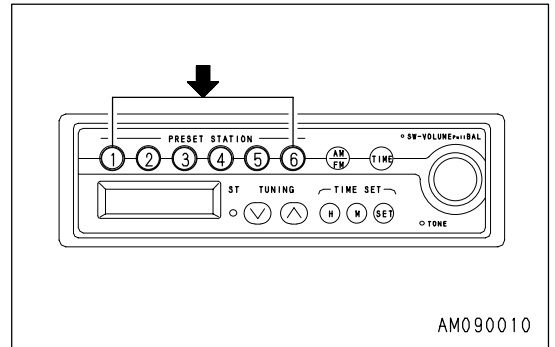
Manual tuning button (TUNING)

Use the buttons(3) to change the frequency.
 Up button (^): Each time the button is pressed, the frequency will go up in steps (FM: 0.1 MHz, AM: 9 kHz).
 Down button (v): Each time the button is pressed, the frequency will go down in steps (FM: 0.1 MHz, AM: 9 kHz).



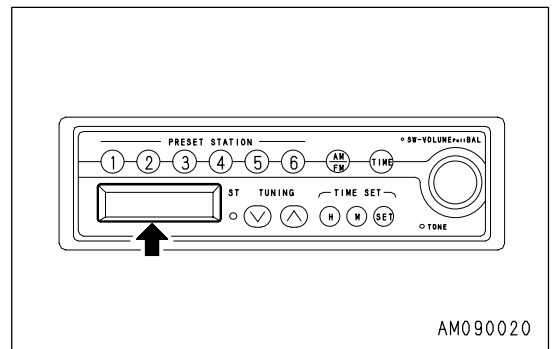
Preset Station Buttons (1, 2, 3, 4, 5, 6)

If these buttons(6) are set to the frequency of the desired broadcasting station, the station can be selected at a touch.
 For details of the method of presetting, see "Preset Station Buttons (PAGE 3-52)".



Display

In this display (7), receiving band, frequency, preset No. and time are shown.



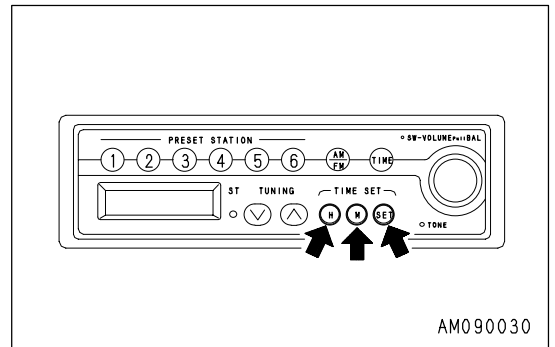
Time Reset Button

This button(8) is used to correct the time.

H: Hour

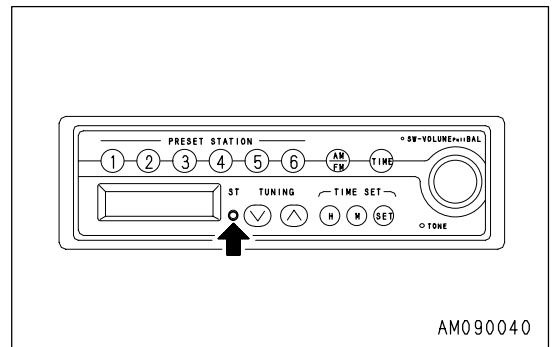
M: Minute

SET: Sets to start of hour (00 minutes)



Stereo Indicator (ST)

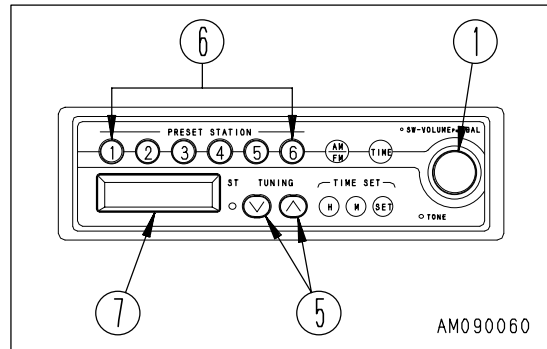
This lamp(9) lights up when a stereo broadcasting is picked up when receiving an FM broadcasting station.



Controls Of Radio

Preset Station Buttons

1. Press power switch (1) and display the frequency on display (7).
2. Turn the tuning button(5) (manual, auto) to adjust to the desired frequency.
3. Select a preset button to use for recording the frequency setting, and keep that button pressed for at least 1.5 seconds. The sound will disappear, but when the setting is recorded, the sound will appear and the preset number will appear on display (7) to show that the station has been preset. After completion of presetting, press preset button (6), and release it within approx. 1.5 seconds. The setting will change to the frequency of the broadcasting station recorded for that button. One AM station and one FM station can be recorded for each preset button.



Manual Tuning

Press tuning button (5) and set to the desired frequency.

Each time the button is pressed, the frequency will move up or down in steps of 9 kHz (AM) or 0.1 MHz (FM).

∨ button: Move to a lower frequency station

∧ button: Move to a higher frequency station

- If the frequency reaches the top or bottom limit, it will automatically change as follows: top limit → bottom limit, or bottom limit → top limit

Automatic Tuning

Keep tuning button (5) pressed for at least 0.5 seconds. When a broadcasting station is picked up, it will automatically stop. To search for the next station, press tuning button (5) again for at least 0.5 seconds.

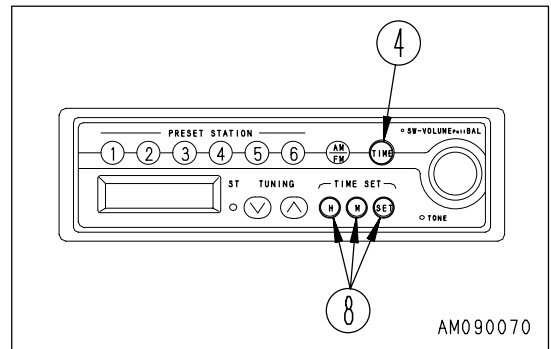
∨ button: Move to a lower frequency station

∧ button: Move to a higher frequency station

- If tuning button (5) is pressed during auto tuning, the auto tuning will be canceled and the frequency at the point where it is canceled will be picked up.

Setting Correct Time

1. Press display selector button (4) to display the time.
After 5 seconds, the display will return to the frequency display and the time cannot be corrected. If this happens, press display selector button (4) again.
2. Press time adjustment button (8) and adjust the hour and minute.
H button: Adjusts hour (advances one hour each time it is pressed)
M button: Adjusts minute (advances one minute each time it is pressed)
If the H or M button are kept pressed, the time will advance continuously until the button is released.
SET button: Sets to start of hour (when it is pressed, the minute returns to 00)
If the minute display is between 0 and 05, and the SET button is pressed, the minute reading will return to 00. If it is pressed when the minute display is between 55 and 59, the minute display will return to 00 and the hour will advance by 1. If the minute display is between 06 to 54, can not adjust.



Example

- 10:05 → 10:00
- 10:59 → 11:00
- 10:26 → 10:26

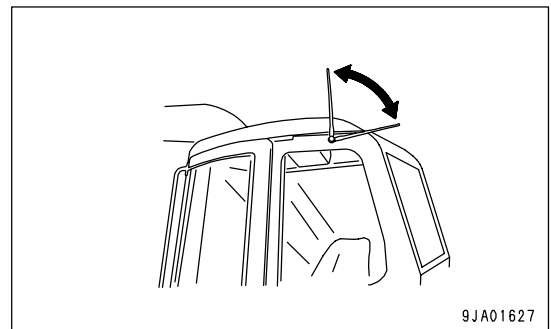
Press the H, M, and SET buttons to set to the correct time.

Antenna

NOTICE

When transporting the machine or parking it in a garage, always fully retract the antenna to avoid the possibility of breakage.

If the receiving wave is weak or generates noise, extend the antenna. If the wave is too strong, adjust the sensitivity by retracting the antenna.



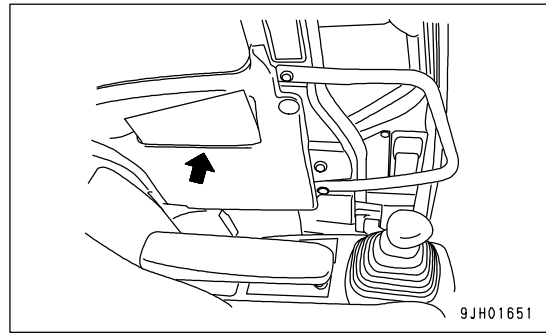
Use Radio With Care

- To ensure safety, always keep the sound to a level where it is possible to hear outside sounds during operation.
- If water gets into the speaker case or radio, it may lead to an unexpected failure, so be careful not to get water on the equipment.
- Do not wipe the scales or buttons with benzene, thinner, or any other solvent. Wipe with a soft dry cloth. Use a cloth soaked in alcohol if the equipment is extremely dirty.
- When the battery is replaced, the settings for the preset buttons are all cleared, so set them again.

OPERATION MANUAL STORAGE

A magazine box is provided on the left side of the operator’s seat for safekeeping the operation and maintenance manual and oil chart.

Always keep the Operation and Maintenance Manual in this pocket so that it is possible to read it at any time.



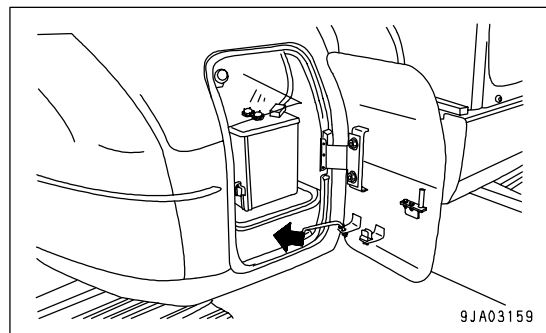
9JH01651

TOOL BOX

NOTICE

Except when opening the cover for some reason, always keep the cover locked.

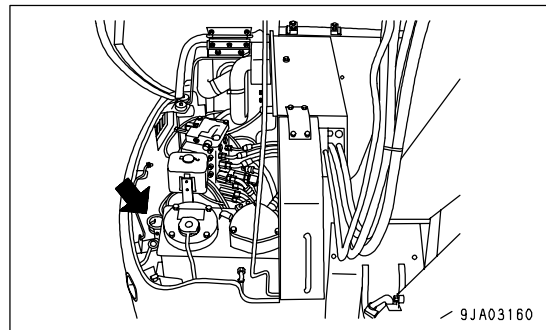
Open the battery inspection cover. Tool box is inside. Store the tools in this box.



9JA03159

GREASE PUMP HOLDER

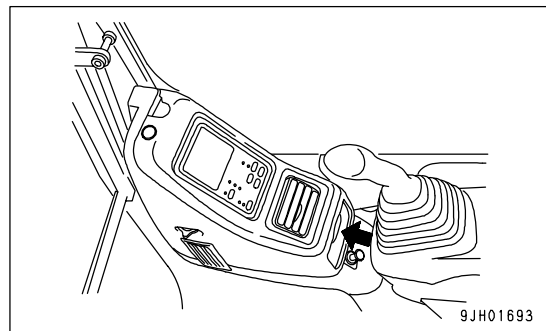
Open the mud cover at right side of machine. Grease pump holder is inside. When not using the grease pump, fit it in the holder.



9JA03160

ASHTRAY

This is on the right front side of the operator’s seat. Be sure to extinguish your cigarette, then close the lid.



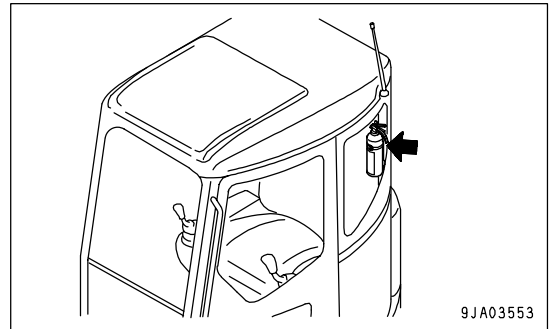
9JH01693

FIRE EXTINGUISHER

(If equipped)

A fire extinguisher is prepared at the rear part inside the operator's cab.

The directions are described on the nameplate affixed to it. Just in case, carefully read and grasp them beforehand.



MACHINE OPERATIONS AND CONTROLS

BEFORE STARTING ENGINE

Walk-Around Checks

Before starting the engine, look around the machine and under the machine to check for loose nuts or bolts, or leakage of oil, fuel, or coolant, and check the condition of the work equipment and hydraulic system. Check also for loose wiring, play, and accumulation of dust at places which reach high temperatures.



WARNING

- When carrying out check or maintenance work inside the engine hood or dust cover, be sure to open them up to the upper end and secure them with a stopper.
- Remove any flammable materials from around the battery or engine muffler, or other high temperature engine parts. Leakage of fuel or oil will cause the machine to catch fire. Check carefully, and sure to repair any abnormalities, or please contact your Komatsu distributor.

If the machine is at an angle, make it horizontal before checking.

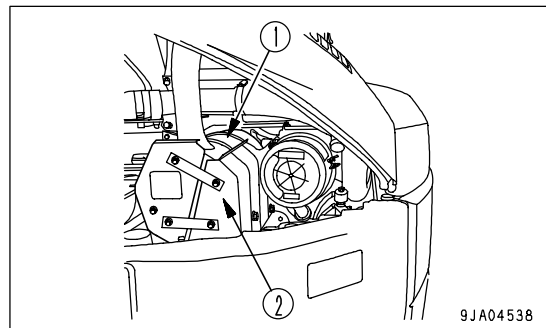
Carry out the following inspections and cleaning every day before starting the engine for the day's work.

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 and 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 grass etc.) accumulated around the battery or high temperature engine parts, such as the engine muffler. Remove all such dirt or flammable material. Check thoroughly if there is any dust stuck particularly between exhaust muffler (1) and exhaust muffler cover (2).



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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 oil leakage from hydraulic equipment, hydraulic tank, hoses, joints

Check that there is no oil leakage. If any abnormality is found, repair the place where the oil is leaking.

5. Check the undercarriage (track, sprocket, idler, guard) for damage, wear, loose bolts, or leakage of oil from rollers.

If any abnormality is found, repair it.

6. Check for abnormality in handrails, steps, loose bolts.

If any abnormality is found, repair it. Tighten any loose bolts.

7. Check for abnormality in gauges and monitor
Check that there is no abnormality in the gauges and monitor in the operator's cab. If any abnormality is found, replace the parts. Clean off any dirt on the surface.
8. Checking window for damage and displacement
Check the window for any damage or displacement. If it is found broken or displaced, repair it. In particular, repairs must be made immediately, once stopping the machine, if the window is broken or displaced during operation. Do not attempt to continue to operate the machine without repair.
9. Checking and cleaning rear view mirror
Check the rear view mirror for any abnormality, and replace it with new one, if it is damaged. Keep the mirror surface clean and adjust the angle so that the lower part of the machine at the rear (a portion whose view is blocked by the engine hood) can be seen from the operator's seat.
10. Seat belt and mounting clamps
Check that there is no abnormality in the seat belt or mounting clamps. If there is any damage, replace with new parts.
11. Check bucket with hook (if equipped) for damage.
Check that there is no damage to the hook, guide, or hook mount. If any abnormality is found, please contact your Komatsu distributor for repair.

Checks Before Starting

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

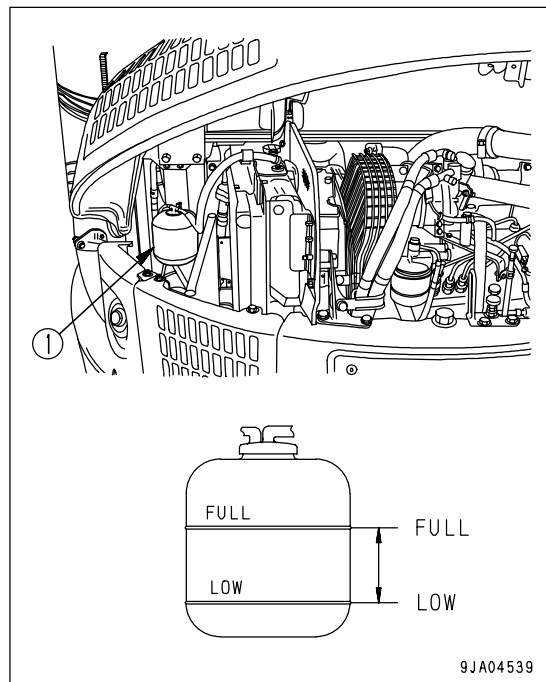
Check Coolant Level, Add Water



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.

1. Open the engine hood and check that the cooling water level is between the FULL and LOW marks on radiator reserve tank (1) (Shown in the diagram on the right). If the water level is low, add clean and soft water through the water filler of reserve tank (1) to the FULL level.
2. After adding water, tighten the cap securely.
3. If the sub tank is empty, there is probably leakage of water. After inspecting, repair any abnormality immediately. If there is no abnormality, check the water level in the radiator. If the water level is low, add water to the radiator, then fill the reserve tank(1).



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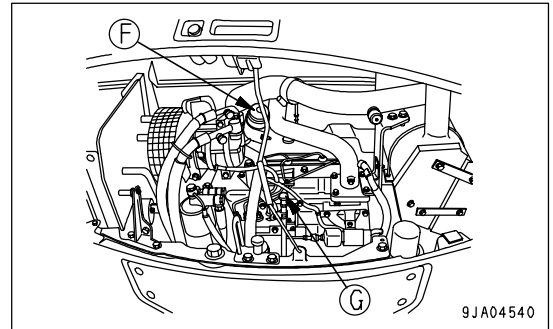
Check Oil Level In Engine Oil Pan, Add Oil



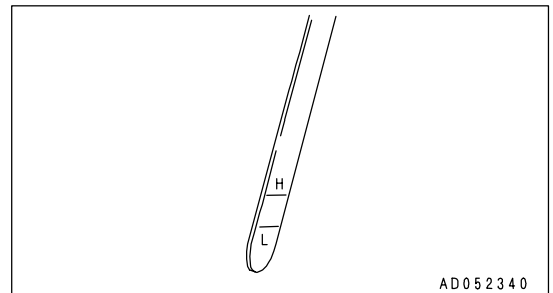
WARNING

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.

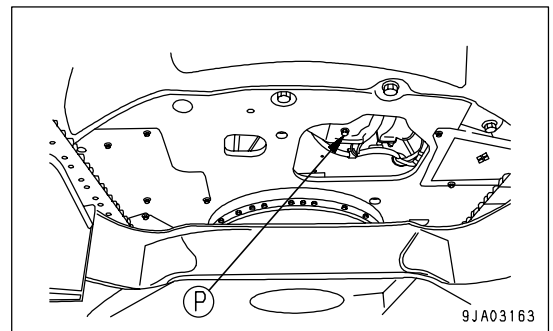
1. Open engine hood.
2. Remove dipstick (G) and wipe the oil off with a cloth.
3. Insert dipstick (G) fully in the oil filler pipe, then take it out again.



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 the oil filler cap securely and close the engine hood.



REMARK

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

Check Fuel Level, Add Fuel

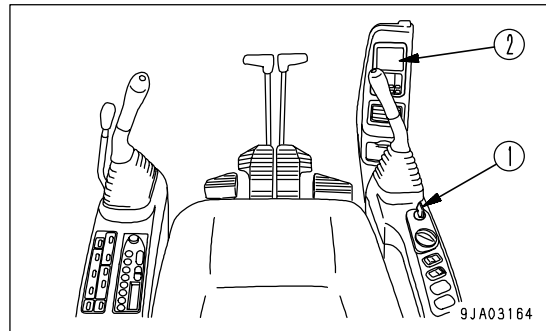
**WARNING**

When adding fuel, never spill the fuel or let it overflow. It will cause fire.

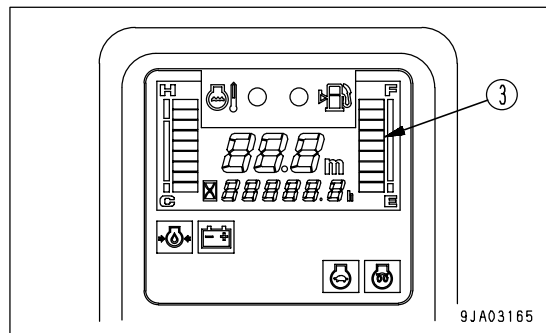
If any fuel has spilled, wipe it up completely. If fuel has spilled over soil or sand, remove that soil or sand.

Fuel is highly flammable and dangerous. Never bring flames near fuel.

1. Insert the key into engine starting switch (1) and turn it to the ON position to light up monitor (2).



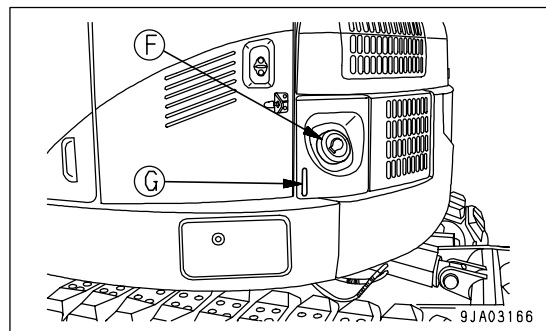
2. Check fuel gauge (3) for the remaining fuel amount.



3. If required, refill fuel through fuel filler port (F), monitoring sight gauge (G).

Fuel tank capacity: 125 liters (33.03 US gal)

4. After adding fuel, tighten the cap securely.

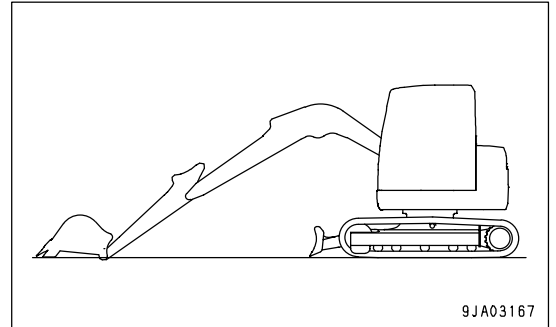


Check Oil Level In Hydraulic Tank, Add Oil**WARNING**

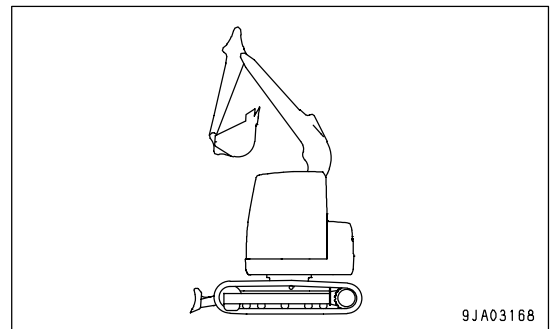
- **The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.**
- **When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.**

1. Check the oil level in the hydraulic tank, keeping the machine in the following conditions.

- 1) If the machine is not in a posture shown in the illustration A at right, start the engine and retract the arm and bucket cylinder, then lower the boom, set the bucket teeth in contact with the ground, and stop the engine.

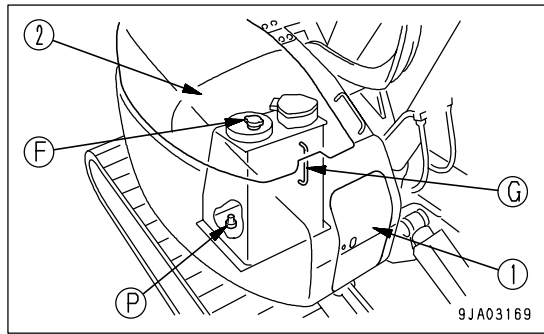


- 2) If the machine is not in a posture shown in the illustration B at right, start the engine and extend the arm and bucket cylinder, while keeping the engine running at low idling. Then as the boom end reached the highest position, stop the engine.



2. Open battery inspection cover (1) and check sight gauge (G) for the oil level. If it stays within the following range, it is regarded as appropriate.

In Machine Condition A: Within the range a
 In Machine Condition B: Within the range b



NOTICE

Do not add oil above the H line. This will damage the hydraulic circuit or cause the oil to spurt out.

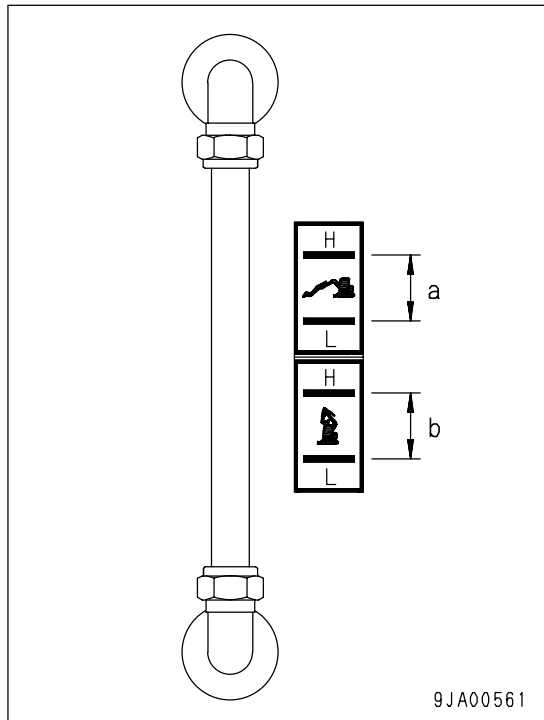
If oil has been added above the H level, stop the upper structure so that the drain plug (P) under the hydraulic tank will be between both tracks, and stop the engine and wait for the hydraulic oil to cool down, then drain the excess oil from drain plug (P).

3. If it is below the L level, open the mud cover and add through filler port (F).

REMARK

The oil level will vary depending upon the oil temperature. Accordingly, use the following as the guide:

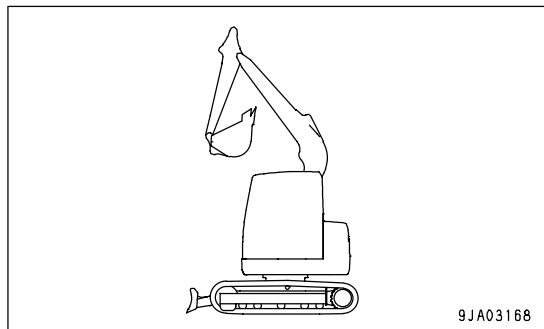
- Before operation: around L level
 (Oil temperature 10 to 30°C (50 to 86°F))
- Normal operation: around H level
 (Oil temperature 50 to 80°C (122 to 176°F))



4. When oil is refilled with the machine in Condition A, fully extend each cylinder of the boom, arm and bucket as illustrated at right, then screw the oil filler cap again after it was removed, and pressurize the hydraulic tank interior.

NOTICE

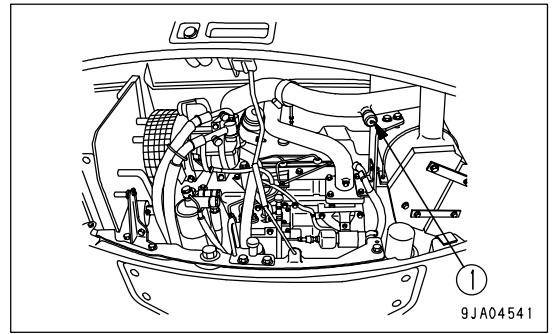
Be sure to pressurize the hydraulic tank. If it is not pressurized, the pump will suck in air, and this will adversely affect the equipment.



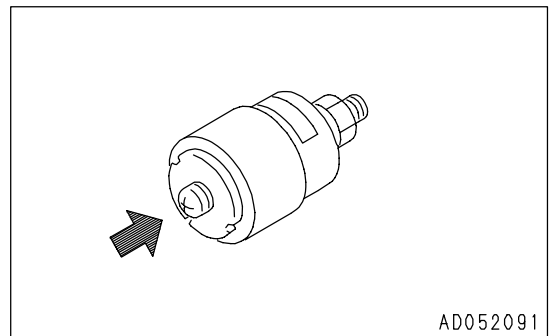
Check Dust Indicator

1. Open the engine hood and check that the red piston is not showing in dust indicator (1).
2. If the red piston has appeared, clean or replace the element immediately.

For details of the method of cleaning the element, see "CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT (PAGE 4-17)".



3. After checking, cleaning, and replacing, press the knob of dust indicator (1) to return the red piston to its original position.

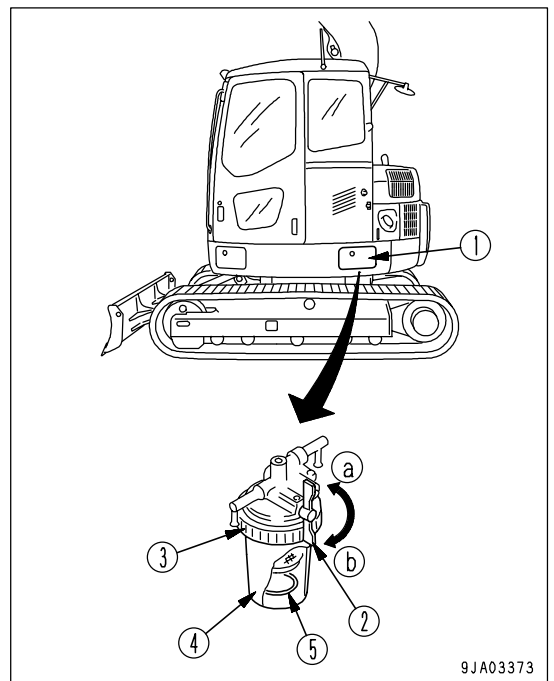


Check Water Separator

If red ring (5) of water separator is at the bottom of element cup (4), there is no water.

If red ring (5) is floating, there is water up to the bottom of the ring, so drain the water as follows.

- Prepare the filter wrench for water separator.
1. Open inspection cover (1) on the left side of the machine and set handle (2) of the filter inside to the CLOSED position (a).
 2. Using the filter wrench, loosen ring (3), then remove element cup (4) and throw out the water inside it.
 3. Fill element cup (4) with fuel, install it to the filter holder, then tighten ring (3).
 4. Set handle (2) to the OPEN position (b).
 5. Drain any water or sediment from fuel tank. For details, see "DRAIN WATER FROM FUEL TANK (PAGE 4-49)".



Check Electric Wirings



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.

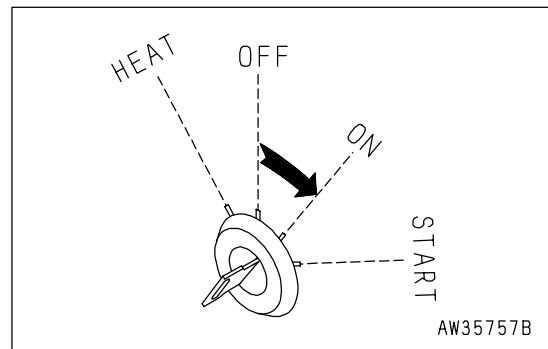
Check that there is no damage to the fuses; that fuses of the specified capacity are used; that there is no disconnection or trace of short-circuiting on the electric wiring and no damage to the covering. Check also that there is no loosened terminal. If any, tighten it again.

Moreover, pay particular attention to the electric wiring when checking the battery, engine starting motor and alternator.

Be sure to check that there is no inflammable material accumulated around the battery. If present, remove it without fail.

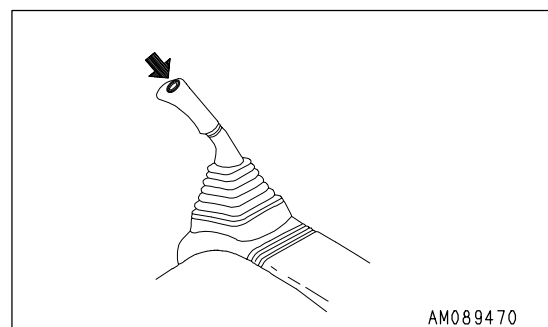
Check Function Of Horn

1. Turn the starting switch to the ON position.



2. Confirm that the horn sounds immediately when the horn button is pressed.

If the horn does not sound, please contact your Komatsu distributor for repair.



Adjustment

WARNING

- Adjust the seat position before starting operations or after changing the operator.
- Adjust the seat so that the control levers and switches can be operated freely and easily with the operator back against the backrest.

Seat Adjustment

(A) Fore-and-aft adjustment

Move lever (1) to the upper, set the operator's seat at the desired position, then release the lever.

Fore-and-aft adjustment: 50 mm (2.0 in)

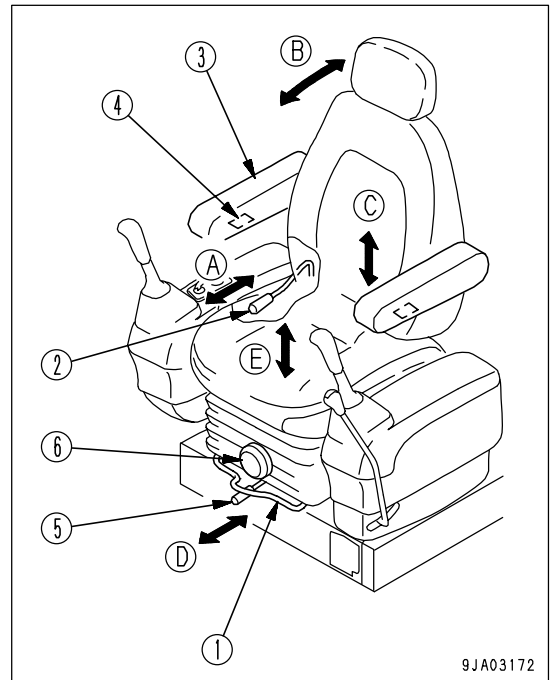
(B) Adjusting reclining

REMARK

The seat can be reclined more when the seat is pushed to the front. The amount of reclining decreases as the seat is pushed back, so when moving the seat back, return the seatback to the upright position.

Pull up lever (2) and set the seat back to a position which is comfortable for operation, then release the lever.

Sit with your back against the seat back when adjusting. If your back is not touching the seat back, the seat back may suddenly move forward.



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(C) Adjusting armrest angle

Armrest (3) can be made to spring up by hand approx. 90°.

In addition, by turning the dial (4) at bottom of armrest by hand it is possible to make fine vertical adjustment of the armrest angle.

Armrest adjustment angle: 25°.

REMARK

If the seat back is tipped to the front without raising the armrest (3), the armrest will rise automatically.

(D) Overall fore-and-aft adjustment of seat

Move lever (5) to right. After the seat is set to the desired position, release the lever (5). In this case, the operator's seat, left and right control levers, and safety lock lever all slide together.

Fore-and-aft adjustment: 100mm (3.9 in)

(E) Adjusting suspension

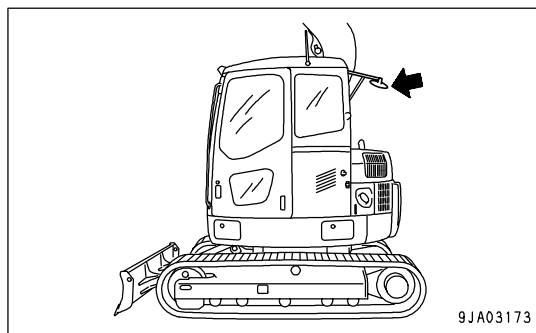
Adjust the weight adjusting dial to your own weight by turning knob (6) under the operator's seat.

The weight can be adjusted to 50 to 120 kg (110 to 265 lb).

If you want to make the seat softer, turn the weight adjustment to a lower weight; if you want to make the seat harder, adjust to a higher weight. When operating on uneven surfaces, adjust the seat to a harder setting.

Rearview Mirrors

Adjust the angle of the mirrors so that the area to the bottom rear of the operator's seat (the area hidden by the engine hood) can be seen clearly.



Seat Belt



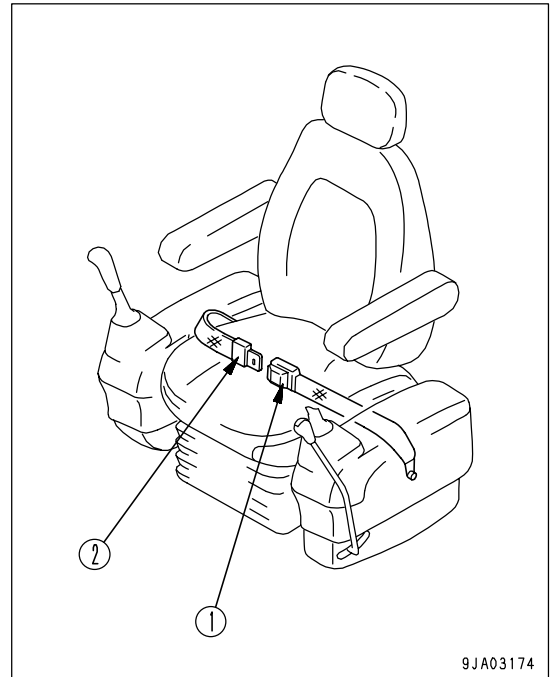
WARNING

- Before fastening the seat belt, check that there is no abnormality in the securing brackets or belt. If there is any wear or damage, replace.
- Even if there appears to be no abnormality in the seat belt, replace the seat belt once every 3 years. The date of manufacture is woven on the reverse side of the belt.
- Adjust and fasten the seat belt before operating the machine.
- Always use the seat belt when operating the machine.
- Do not use the seat belt with either half of the belt twisted.

Check that the bolts of the clamp securing the belt to the chassis are not loose. Tighten them if they are loose. The tightening torque for the mounting bolt is 24.5 ± 4.9 N·m (2.5 ± 0.5 kgf·m, 18.1 ± 3.6 lbf·ft). If the belt surface is scratched or frayed or if the fittings are broken or deformed, replace the seat belt unit.

Fastening and Removing

1. Adjust the seat so that the operator still feels that there is sufficient knee room when fully depressing the pedal while seated, with the operator's back against the backrest.
2. After adjusting the seat position, sit in the seat. Grip buckle (1) and tongue (2) in each hand and insert tongue (2) into buckle (1). Confirm by pulling the belt that the tongue is securely locked to the buckle.
3. Depress the red button on buckle (1) to unfasten the seat belt.

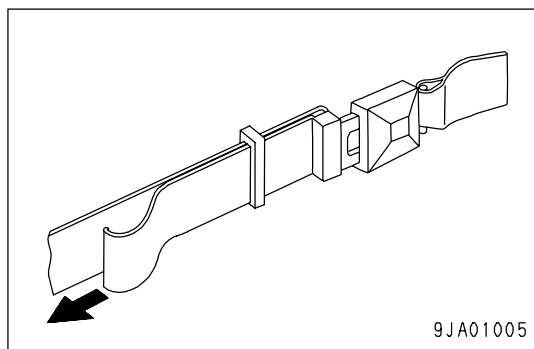


Fasten belt along your body without kinking it. Adjust the lengths of the belt on the tongue sides.

Seat Belt Adjustment

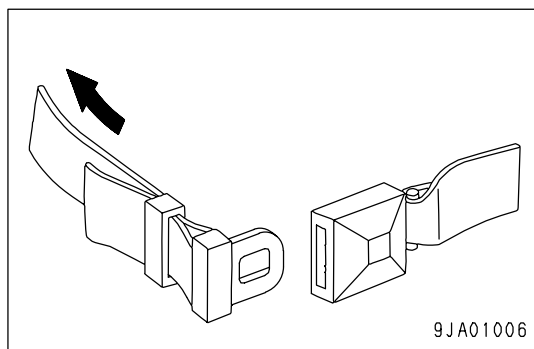
Shortening

Pull the free end on the tongue side.



Lengthening

Pull the seat belt with a tongue in the direction perpendicular to the tongue.



Wind-in Type Seat Belt

(If equipped)



WARNING

- Before fitting the seat belt, check that there is no abnormality in the belt mount bracket or mounting belt. If it is worn or damaged, replace the seat belt.
- Even if no abnormality can be seen in the belt, replace the seat belt every 3 years. The date of manufacture of the belt is shown on the back of the belt.
- Always wear the seat belt during operation.
- Fit the seat belt so that it is not twisted.

Fastening and Removing Seat Belt

This seat belt has a wind-in device, so it is not necessary to adjust the length.

Fastening seat belt

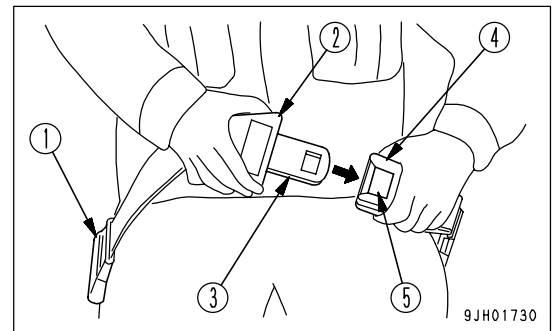
Hold grip (2) and pull the belt out from wind-in device (1), check that the belt is not twisted, then insert tongue (3) into buckle (4) securely.

When doing this, pull the belt lightly to check that it is properly locked.

Removing belt

Press button (5) in buckle (4), and remove tongue (3) from buckle (4).

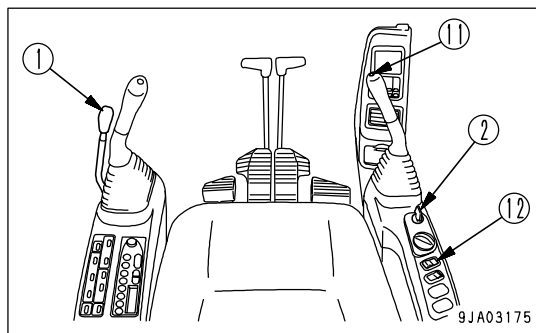
The belt is automatically wound in, so hold grip (2) and return the belt slowly to wind-in device (1).



Operations Before Starting Engine

! WARNING

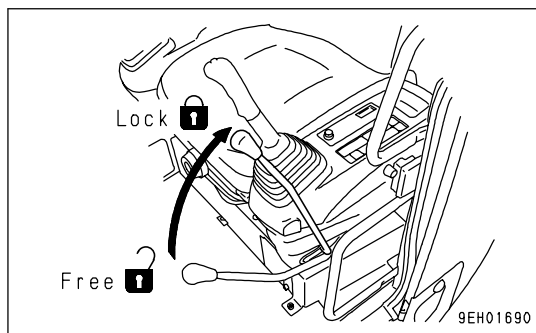
When standing up from the operator's seat, always set the safety lock lever to the LOCK position, regardless of whether the engine is running or stopped.



1. Check the safety lock lever (1) is at the LOCK position.

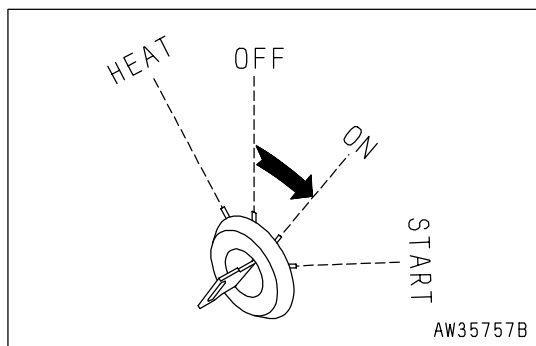
REMARK

The engine does not start, if the safety lock lever is not in the LOCK position.



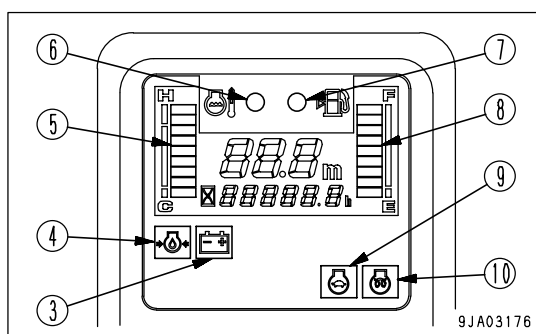
2. Check that each control lever is in the NEUTRAL position.

3. Insert the key in starting switch (2), turn the key to the ON position, then carry out the following checks.



- 1) The buzzer will sound for approx. 1 sec, and the following monitors and gauges will light up for approx. 3 sec.

- Charge level monitor (3)
- Engine oil pressure monitor (4)
- Engine coolant temperature gauge (5)
- Engine coolant temperature monitor (6)
- Fuel level monitor (7)
- Fuel level monitor (8)
- Swift deceleration monitor (9)
- Pre-heating monitor (10)

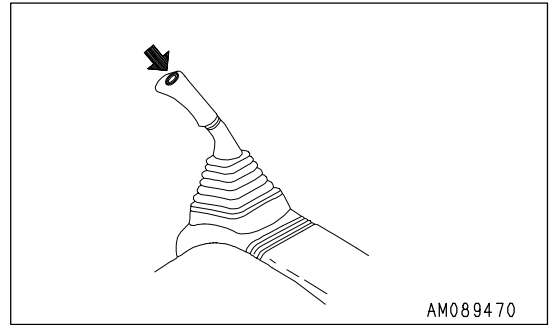


If the monitors or gauges do not light up or the buzzer does not sound, there is probably a blown bulb or disconnection, so please contact your Komatsu distributor for repair.

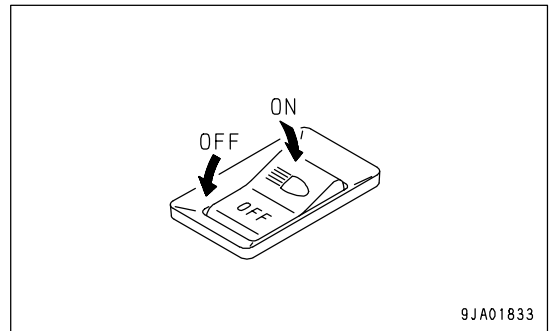
After approx. 3 seconds, the following monitors and gauges will remain on and the others will go out.

- Charge level monitor (3)
- Engine oil pressure monitor (4)
- Engine coolant temperature gauge (5)
- Fuel level monitor (8)

2) Press horn switch (11) to confirm that the horn will sound.



3) Press lamp switch (12) to turn on the working lamps. If it does not light up, there is probably a blown bulb or disconnection, so please contact your Komatsu distributor for repairs.



STARTING ENGINE

Normal Starting



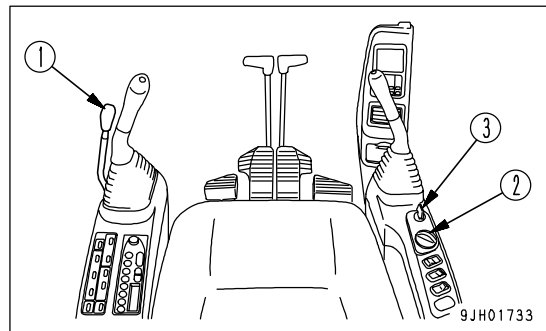
WARNING

- Start the engine only after sitting down in the operator's seat.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.
- 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.

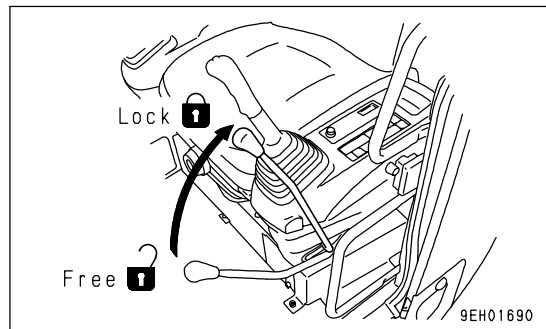
NOTICE

- Do not try to start the engine with the fuel adjustment dial set near the full engine rotation. Otherwise the engine parts may be damaged.
- Do not keep the starting motor rotating continuously for more than 20 seconds.

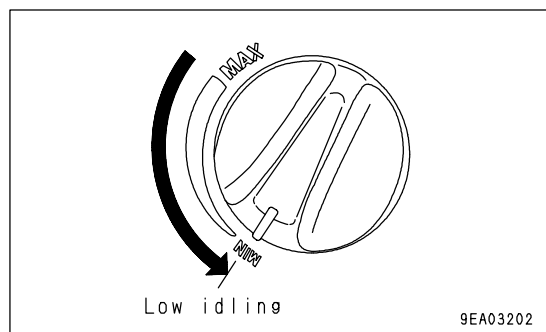
If the engine will not start, wait for at least 2 minutes before trying to start the engine again.



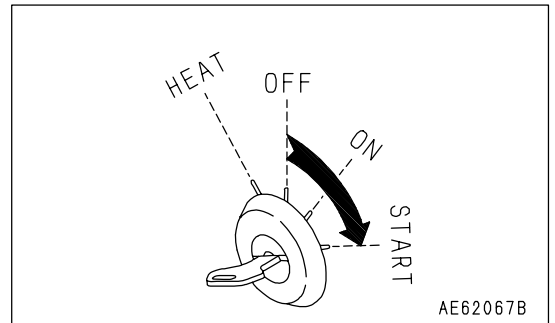
1. Check the safety lock lever (1) is at the LOCK position. If the safety lock lever is in the FREE position, the engine does not start.



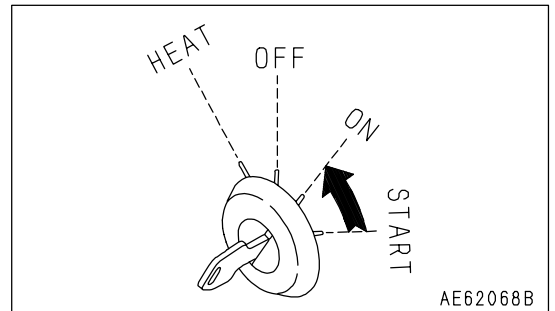
2. Set fuel control dial (2) at the low idling position.



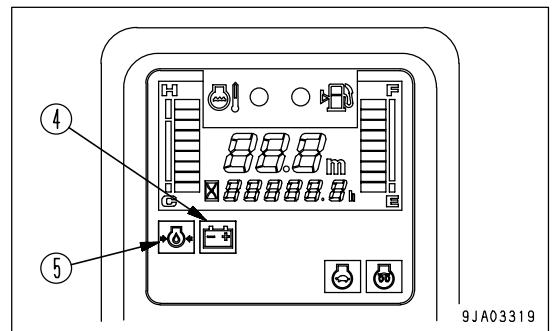
3. Turn the key in starting switch (3) to the START position. The engine will start.



4. When the engine start, release the key in the starting switch (3). The key will return automatically to the ON position.



5. Keep the engine idling for the initial 15 seconds right after it has been started, and do not operate any control lever or the fuel adjustment dial during that time.
6. Check that battery charging level monitor (4) lamp and engine oil pressure monitor (5) lamp do not light up.



Starting Engine In Cold Weather



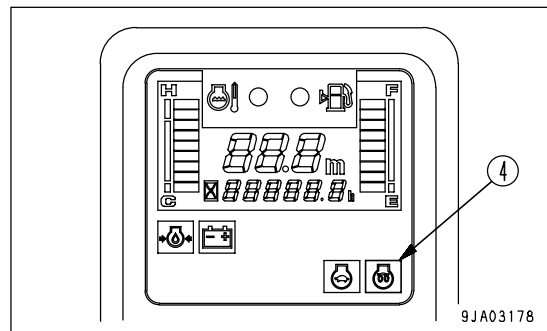
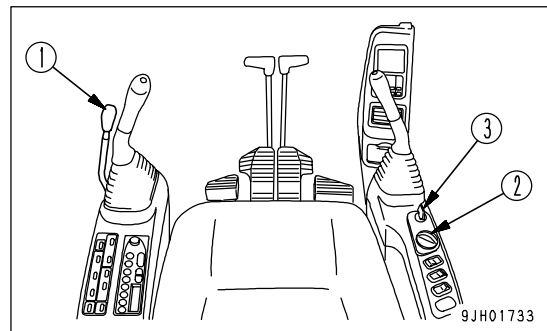
WARNING

- Start the engine only after sitting down in the operator's seat.
- Do not attempt to start the engine by short-circuiting the engine starting circuit. Such an act may cause a serious bodily injury or fire.
- Check that there are no persons or obstacles in the surrounding area, then sound the horn and start the engine.
- Never use starting aid fluids as they may cause explosions.
- Exhaust gas is toxic. When starting the engine in confined spaces, be particularly careful to ensure good ventilation.

NOTICE

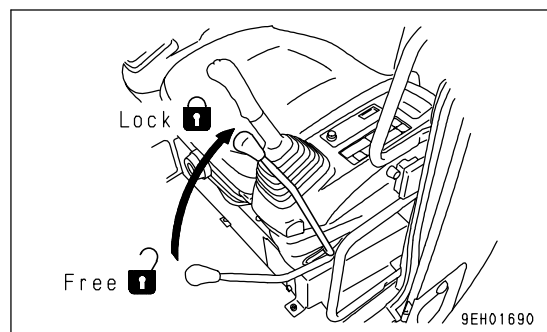
- Do not try to start the engine with the fuel adjustment dial set near the full engine rotation. Otherwise the engine parts may be damaged.
- Do not keep the starting motor rotating continuously for more than 20 seconds.

If the engine fails to start, wait for about 2 minutes and repeat from Step 4.



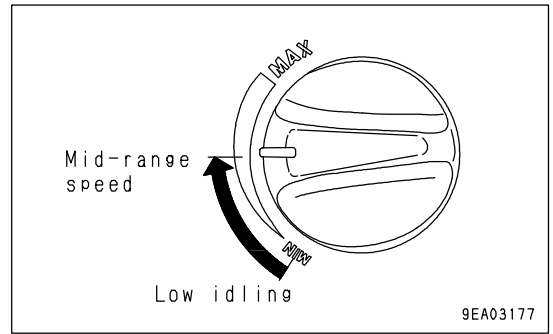
When starting in low temperatures, do as follows.

1. Check the safety lock lever (1) is at the LOCK position. If the safety lock lever is in the FREE position, the engine does not start.



2. Before starting the engine, check that fuel control dial (2) is at the low position.

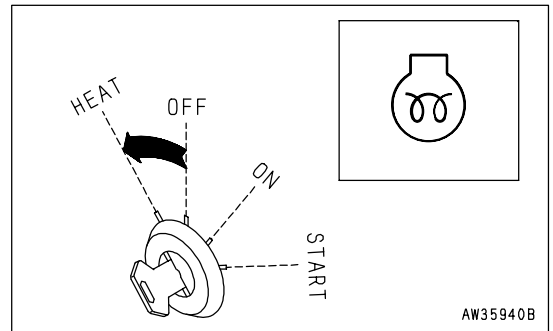
- Turn fuel control dial (2) to the center position between LOW IDLING and HIGH IDLING.



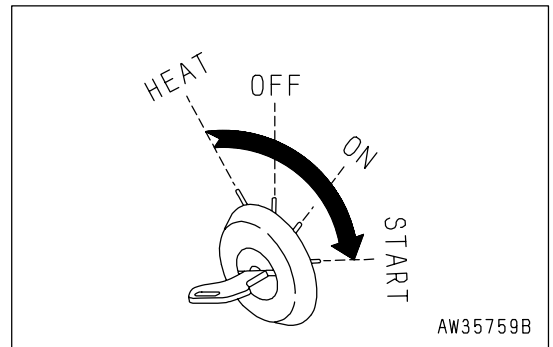
- Hold the key in starting switch (3) at the HEAT position, and check that pre-heating monitor (4) lights up. After about 30 seconds, pre-heating monitor (4) will flash 10 seconds to indicate that pre-heating is finished.

REMARK

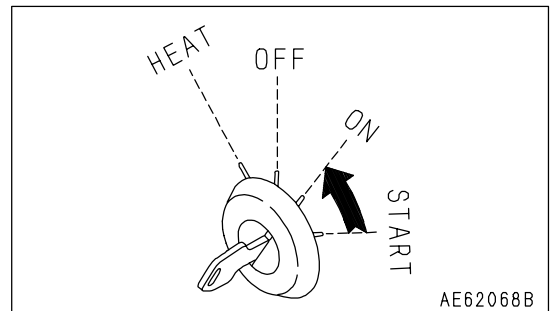
The monitor and gauge also light up when the key is at the HEAT position, but this does not indicate any abnormality.



- When pre-heating monitor (4) goes off, turn the key in starting switch (3) to the START position to start the engine.

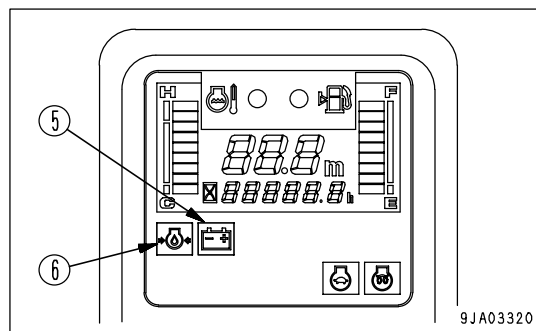


- When the engine start, release the key in the starting switch (3). The key will return automatically to the ON position.



- Keep the engine idling for the initial 15 seconds right after it has been started, and do not operate any control lever or the fuel adjustment dial during that time.

8. Check that charge level monitor (5) and engine oil pressure monitor (6) goes off.



AFTER STARTING ENGINE



WARNING

- **Emergency stop**
If there has been any abnormal action or trouble, turn the starting switch key to the OFF position.
 - **If the work equipment is operated without warming the machine up 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.**
 - **For operation patterns other than the standard one (ISO pattern), refer to the chapter of ATTACHMENTS AND OPTIONS in this manual.**
-

Breaking-In The New 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.

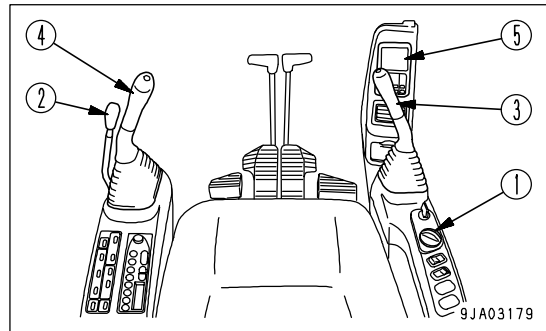
- Idle the engine for 5 minutes after starting it up.
- Avoid operation with heavy loads or at high speeds.
- Immediately after starting the engine, avoid sudden starts, sudden acceleration, unnecessary sudden stops, and sudden changes in direction.

Warming-Up Operation

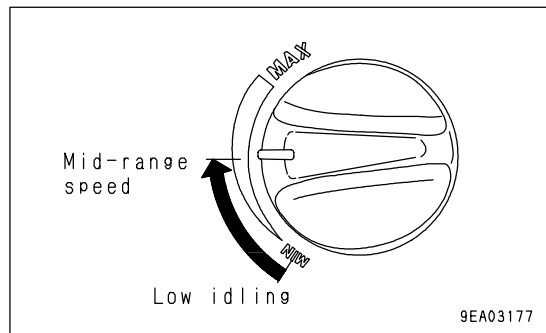
NOTICE

- When the hydraulic oil is at a low temperature, do not carry out operations or move the lever suddenly. Always carry out the warming-up operation. This will help to extend the machine life.
- 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. (Oil down) 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.

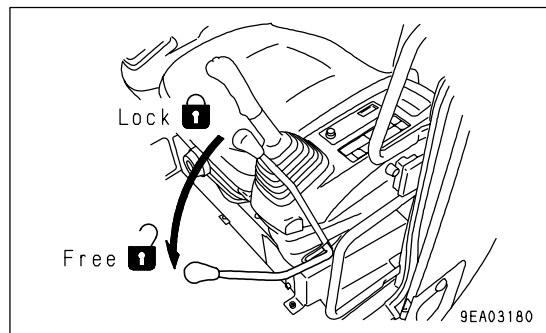
After starting the engine, do not immediately start operations. First, carry out the following operations and checks.



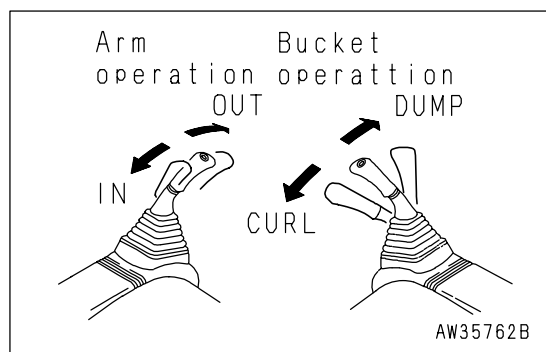
1. Turn fuel control dial (1) to the center position between LOW IDLING and HIGH IDLING and run the engine at medium speed for about 5 minutes with no load.



2. Set safety lock lever (2) to the FREE position, and raise the bucket from the ground.



3. Operate bucket control lever (3) and arm control lever (4) slowly to move the bucket cylinder and arm cylinder to the end of the stroke.
4. Operate the bucket for 30 seconds and the arm for 30 seconds in turn fully for 5 minutes.

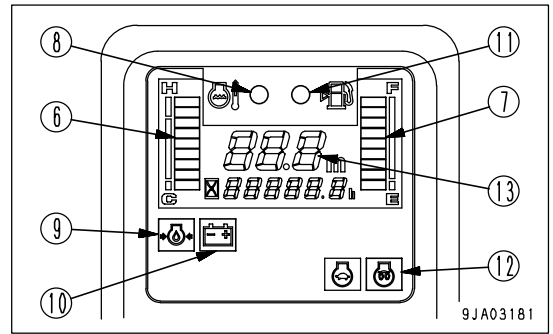


NOTICE

When the work equipment is retracted, take care that it does not interfere with the machine body or ground.

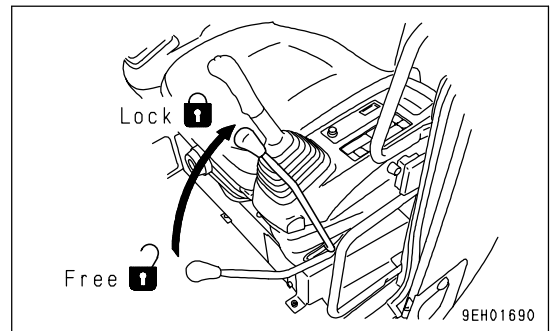
5. After carrying out the warming-up operation, check that machine monitor (5) is in the following condition.

- Engine coolant temperature gauge (6): Inside green range
- Fuel gauge: Inside green range
- Engine coolant temperature monitor (8): OUT
- Engine oil pressure monitor (9): OUT
- Charge level monitor (10): OUT
- Fuel level monitor (11): OUT
- Pre-heating monitor (12): OUT
- Display (13): OUT



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

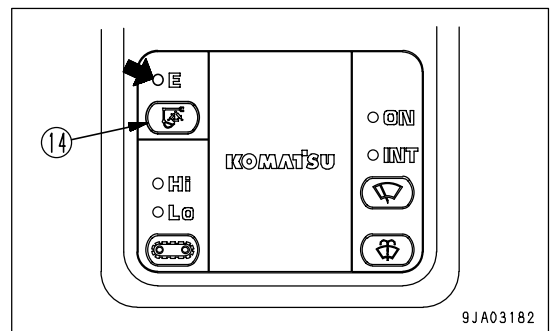
7. Move safety lock lever (2) to the LOCK position and confirm that none of the operations for the control levers, work equipment, blade (if a blade is installed), swing and travel can be made.



8. Turn working mode changing switch (14) in monitor panel (5) to the actual working mode.

When monitor lamp (E) lights up: E Mode (for work focusing on fuel consumption ratio)

When monitor lamp (E) does not light up: Active Mode (for heavy-duty work)

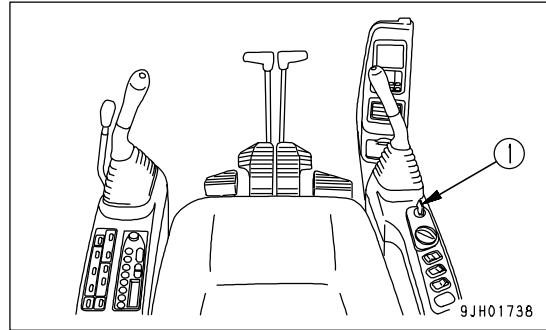


STOPPING THE ENGINE

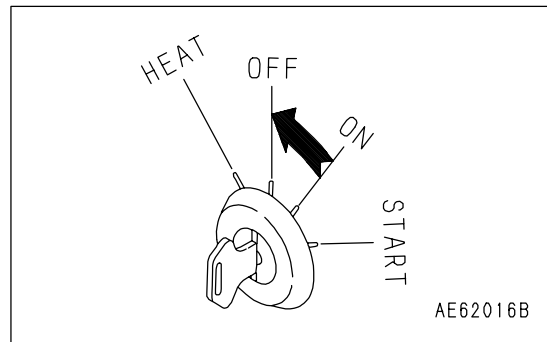
NOTICE

If the engine is stopped abruptly, service life of component parts of the engine may be considerably reduced. Hence do not stop the engine abruptly except in an emergency. If the engine has overheated, do not try to stop it abruptly but run it at medium speed to allow it to cool down gradually, and 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).



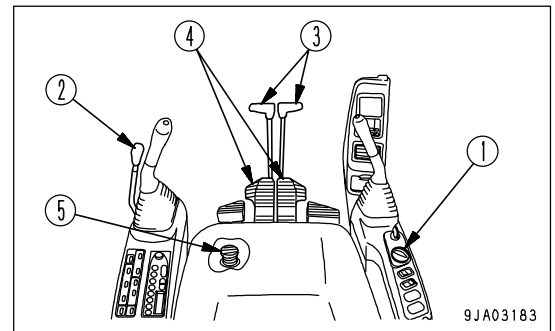
CHECK AFTER SHUT OFF ENGINE

1. Walk around the machine and check the work equipment, machine exterior, and undercarriage, and check also for leakage of oil or water. If any abnormalities are found, repair them.
2. Check the engine compartment for paper and debris. Clean out any paper and debris to avoid a fire hazard.
3. Remove any mud affixed to the undercarriage.

MACHINE OPERATION

**WARNING**

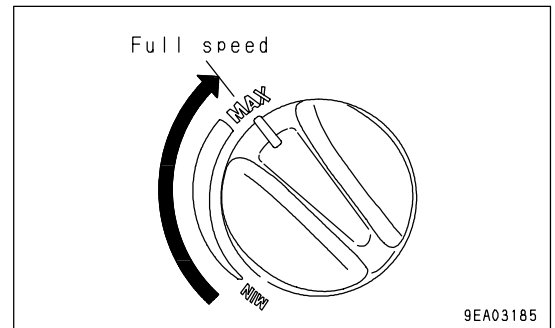
- Before operating the steering levers, check the direction of the track frame.
If the sprocket is at the front, the operation of the travel levers is reversed.
- When moving off, check that the area around the machine is safe, and sound the horn before moving.
- Do not allow anyone in the area around the machine.
- Remove all obstacles from the travel path of the machine.
- The rear of the machine is a blind spot, so be particularly careful when travel in reverse.
- Check that the travel alarm works properly.

**Preparations For Moving The Machine Off**

1. Turn fuel control dial (1) towards the full speed position to increase the engine speed.

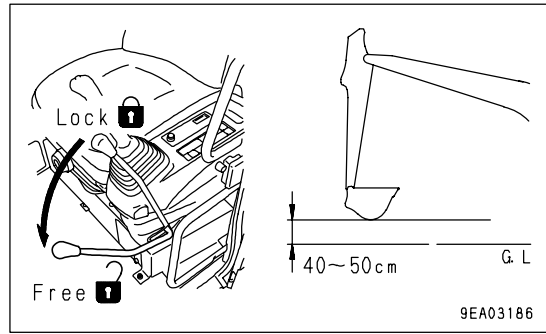
REMARK

If the engine speed does not rise, it is possible that the swift deceleration switch is ON. Check the swift deceleration display lamp. For details of operation of the swift deceleration switch, see "Swift Deceleration Switch (PAGE 3-16)".



Moving Machine Forward

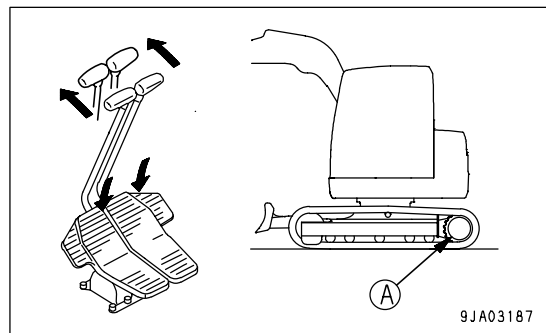
1. Set safety lock lever (2) to the FREE position, then raise the work equipment 40 to 50 cm (1.6 to 2.0 in) from the ground.



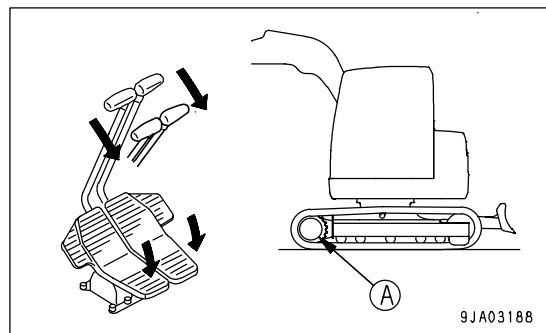
2. Raise the blade.

3. Operate right and left travel control levers (3) or right and left travel pedals (4) in the following manner.

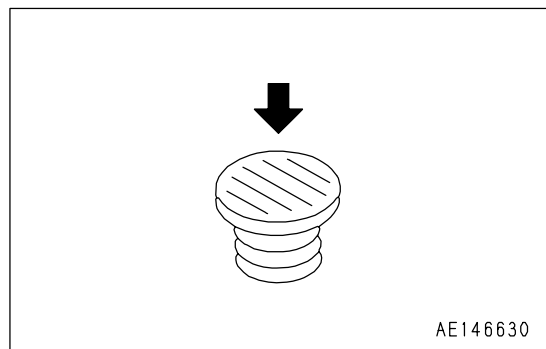
- When sprocket (A) is situated at the rear of the machine;
Start the machine either by pushing lever (3) forward slowly or by stepping on the front part of pedal (4) slowly.



- When sprocket is situated at the front of the machine;
Start the machine either by pulling lever (3) back slowly or by stepping on the rear part of pedal (4) slowly.



4. Travel speed will increase, if traveling accelerator pedal (5) is depressed, while traveling at low speed ("Lo" lamp lights up). For details of the speed, see "SPECIFICATIONS (PAGE 5-2)".

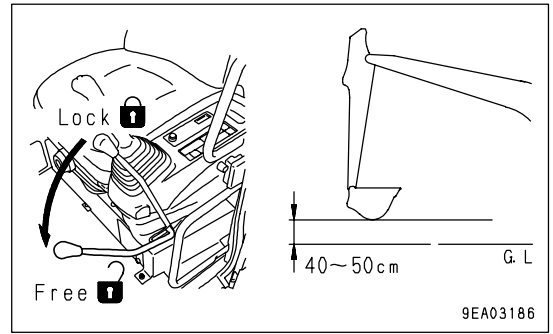


5. Check that the travel alarm sounds.

If the alarm does not sound, please contact your Komatsu distributor for repairs.

Moving Machine Backward

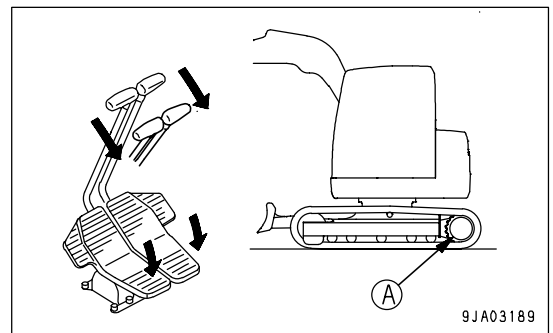
1. Set safety lock lever (2) to the FREE position, then raise the work equipment 40 to 50 cm (1.6 to 2.0 in) from the ground.



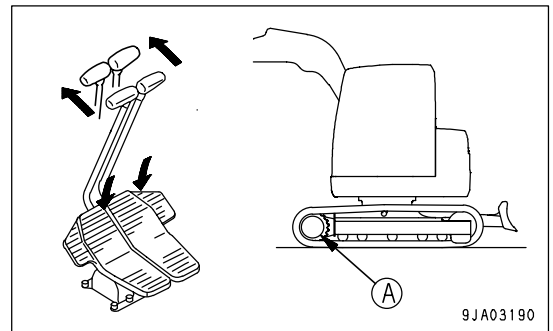
2. Raise the blade.

3. Operate right and left travel control levers (3) or right and left travel pedals (4) in the following manner.

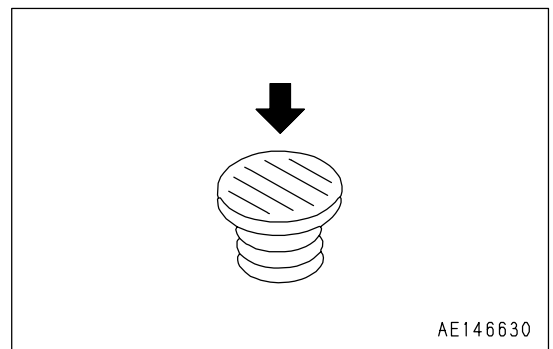
- When sprocket is situated at the rear of the machine;
Start the machine either by pulling lever (3) back slowly or by stepping on the rear part of pedal (4) slowly.



- When sprocket (A) is situated at the front of the machine;
Start the machine either by pushing lever (3) forward slowly or by stepping on the front part of pedal (4) slowly.



4. Travel speed will increase, if traveling accelerator pedal (5) is depressed, while traveling at low speed ("Lo" lamp lights up). For details of the speed, see "SPECIFICATIONS (PAGE 5-2)".



5. Check that the travel alarm sounds.

If the alarm does not sound, please contact your Komatsu distributor for repairs.

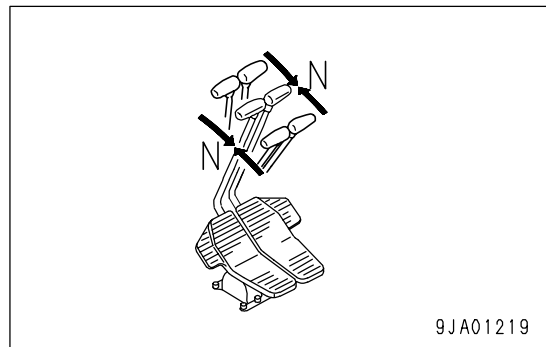
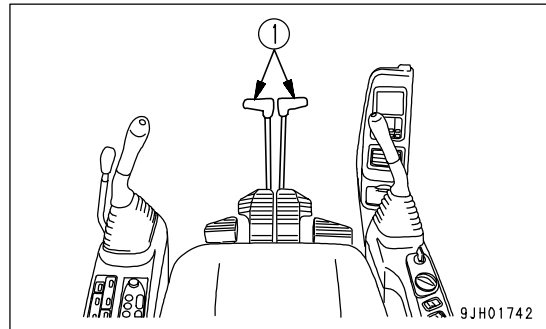
Stopping Machine



WARNING

Avoid stopping suddenly. Give yourself ample room when stopping.

Put the left and right travel levers (1) in the neutral position, then stop the machine.



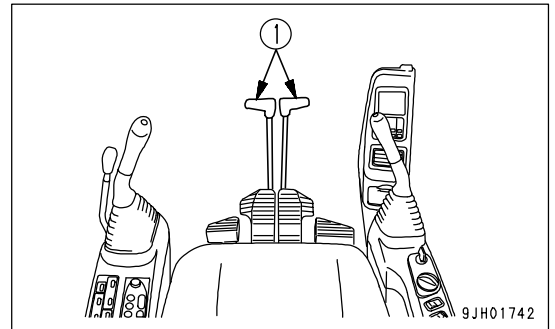
STEERING THE MACHINE

Steering



Before operating the travel control levers, check the direction of the track frame (i.e. position of the sprocket) first. If the sprocket is at the front, the machine moves in the reverse direction to the operation of the travel lever.

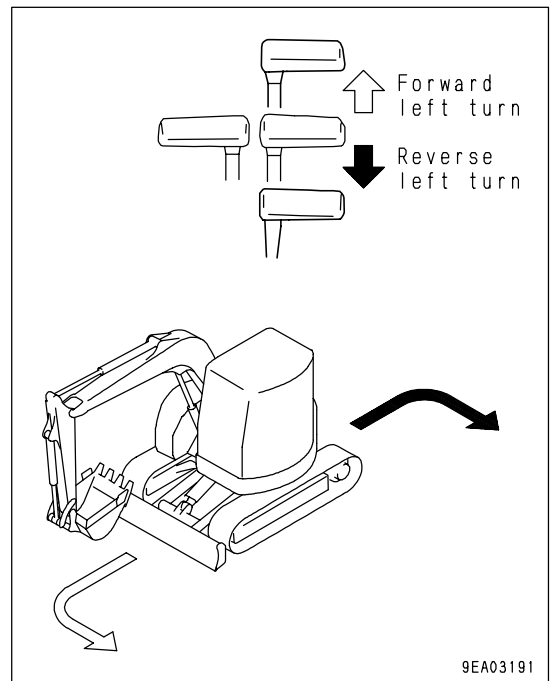
Use the travel levers to change direction.
 Avoid sudden changes of direction as far as possible. In particular, when carrying out counter-rotation (spin turn), stop the machine first before turning.
 Operate two travel levers (1) as follows.



Steering the Machine when Stopped

When turning to the left:
 Push the right travel lever forward to turn to the left when traveling forward; and pull it back to turn left when traveling in reverse.

REMARK
 When turning to the right, operate the left travel lever in the same way.



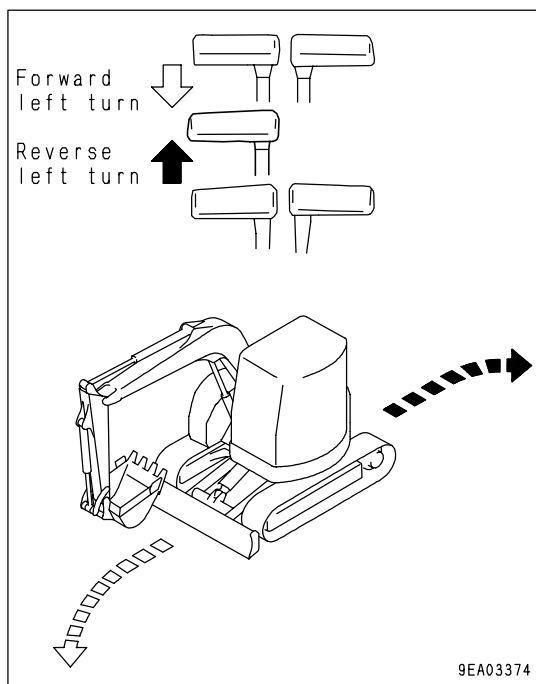
Changing Direction of the Machine

When turning to the left:

If the left travel lever is returned to the neutral position, the machine will turn to the left.

REMARK

When turning to the right, operate the right travel lever in the same way.

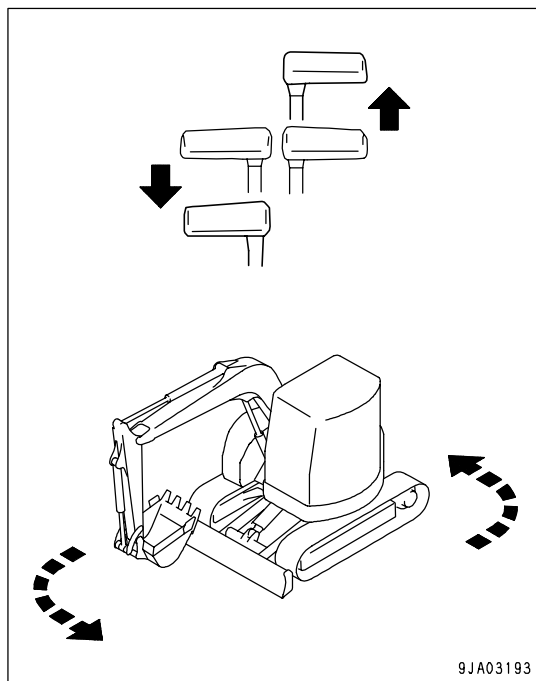


Counter-rotation Turn (Spin Turn)

When using counter-rotation (spin turn) to turn left, pull the left travel lever back and push the right travel lever forward.

REMARK

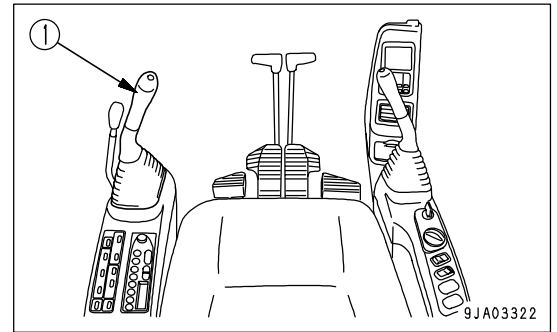
When using counter-rotation to turn right, pull the right travel lever back and push the left travel lever forward.



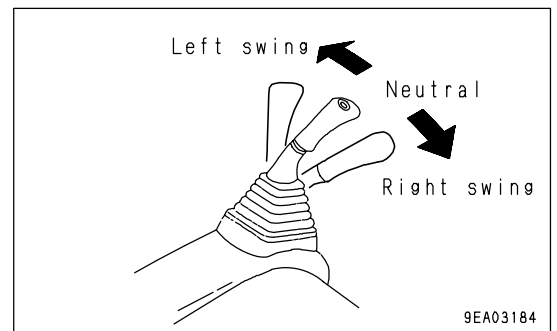
SWINGING

**WARNING**

When operating the swing, check that the area around the machine is safe.



1. Operate left work equipment control lever (1) to swing the upper structure.
2. When not using the swing, set left work equipment control lever (1) to the N position.
The swing holding brake will be applied.



WORK EQUIPMENT CONTROLS AND OPERATIONS**! WARNING**

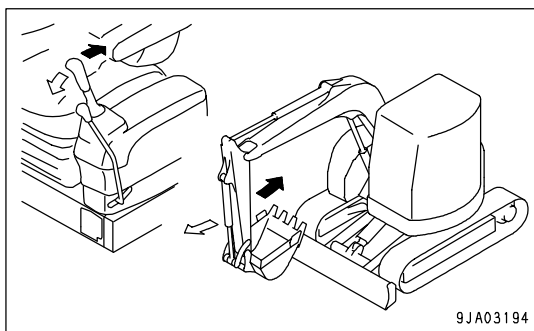
For operation modes other than the standard one (ISO pattern), refer to the chapter of **ATTACHMENTS AND OPTIONS** in this manual.

Use the control levers to operate the work equipment.

Note that when the levers are released, they return to the HOLD position and the work equipment is held in that position.

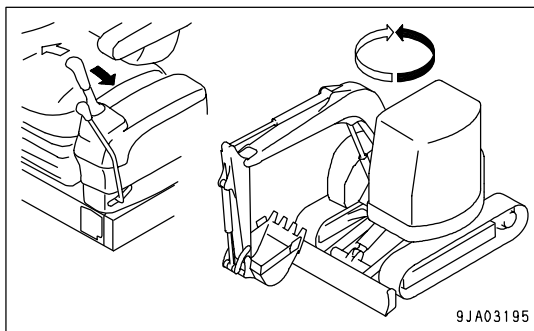
- Arm control

Move the left work equipment control lever to the front or rear to operate the arm.



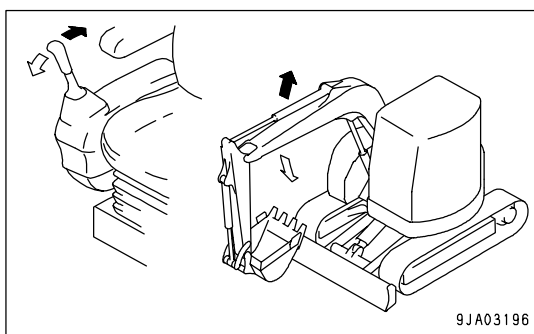
- Swing control

Move the left work equipment control lever to the left or right to swing the upper structure.

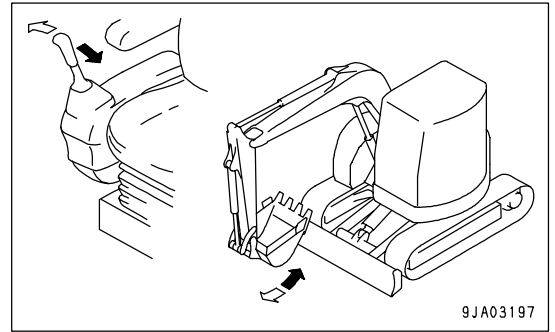


- Boom control

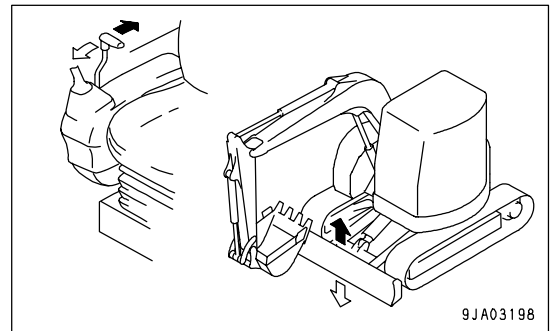
Move the right work equipment control lever to the front or rear to operate the boom.



- Bucket control
Move the right work equipment control lever to the left or right to operate the bucket.



- Blade control (blade specification)
Move the lever on the right side of the operator's seat to the front or rear to operate the blade.



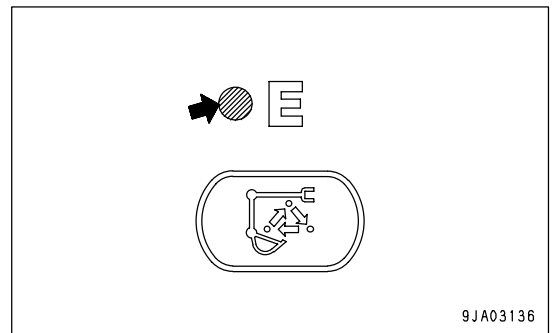
WORKING MODE

By using the working mode selector switch to select a working mode that matches the operating condition, it is possible to carry out operations efficiently.
Use the following procedure to make effective use of each working mode.

Active Mode (for heavy-duty work) and E Mode (for work focusing on fuel consumption ratio) are alternated, every time the working mode switch is depressed.

REMARK

Active Mode (for heavy-duty work) is automatically selected, when the engine is started.



Working mode	Lamp (E)	Applicable operations	Set rotation during work* (rpm)
Active mode (for heave-load operations)	Goes off	Normal digging, loading operations	2,020 ± 50
E mode (For work focusing on fuel consumption ratio)	Lights up	Normal digging, loading operations (When importance is placed on fuel consumption ratio)	1,850 ± 100

*: This is the engine rotation when the fuel adjusting dial is set at the FULL position and no load is applied.

REMARK

When the working mode is switched from Active Mode to E Mode with the fuel adjusting dial set at the FULL position, the engine rotation somewhat drops, but that is nothing unusual.

PROHIBITED OPERATIONS

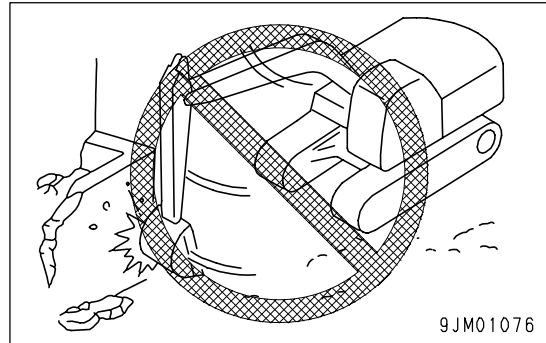


WARNING

Do not attempt to operate the work equipment control lever, while the machine is traveling.

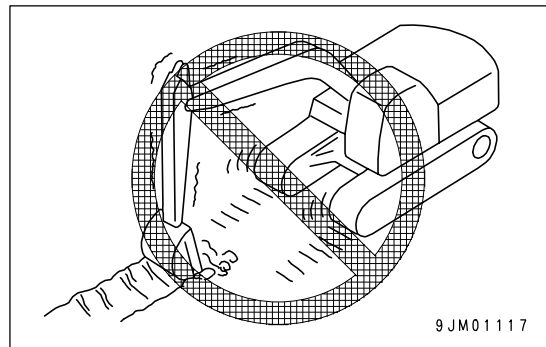
Operations Using Swing Force

Do not use the swing force to compact soil or break objects. This is not only dangerous, but will also markedly reduce the life of the machine.



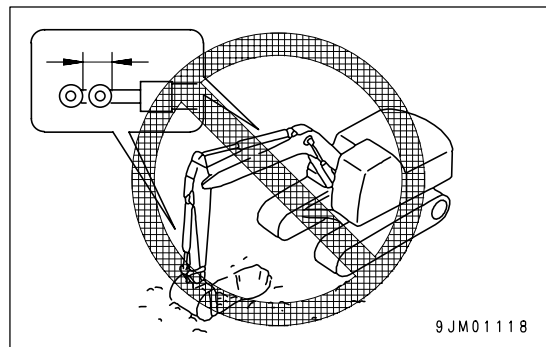
Operations Using Travel Force

Do not dig the bucket into the ground and use the travel force to carry out excavation. This will damage the machine or work equipment.



Prohibition of Operations Using Hydraulic Cylinders to Stroke Ends

If the work equipment is used with the cylinder rod operated to its stroke end, and given impact by some external force, the hydraulic cylinders will be damaged, causing personal injury. Avoid operations with the hydraulic cylinder fully retracted or fully extended.

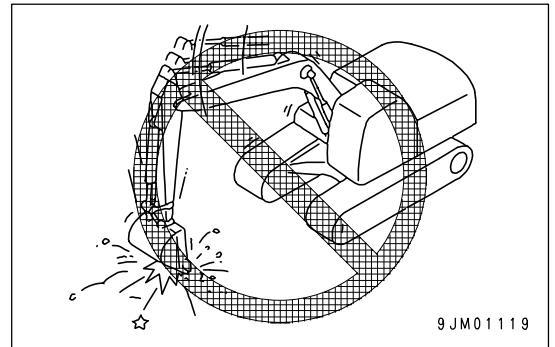


Digging Hard Rocky Ground

Do not attempt to directly excavate hard rocky ground with the work equipment. It is better to excavate it after breaking up by some other means. This will not only save the machine from damage but make for better economy.

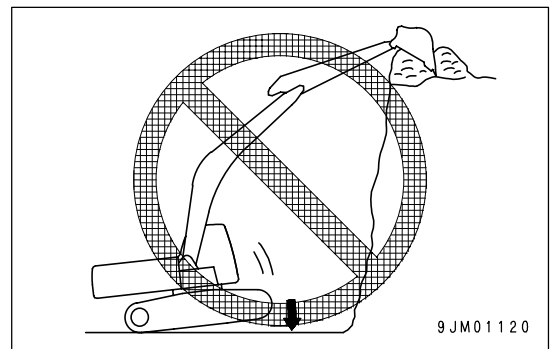
Operations Using Bucket Dropping Force

Do not use the dropping force of the machine for digging, or use the dropping force of the bucket as a pickaxe, breaker, or pile driver. This will markedly reduce the life of the machine.



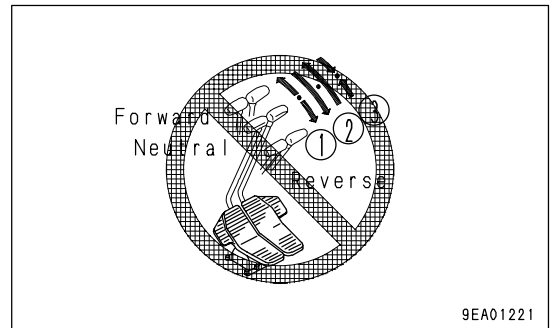
Operations Using Machine Dropping Force

Do not use the dropping force of the machine for digging.



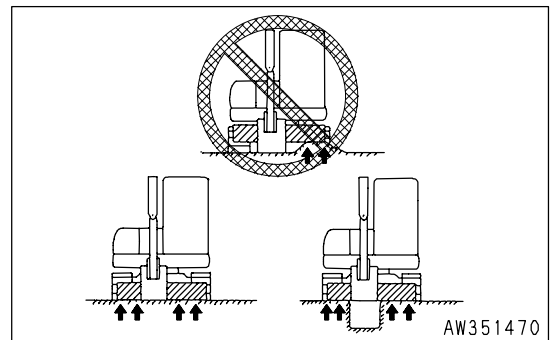
Sudden Lever Shifting High Speed Travel

- (1) Never carry out sudden lever shifting as this may cause sudden starting.
- (2) Avoid sudden lever shifting from forward to reverse (or from reverse to forward).
- (3) Avoid sudden lever shifting change such as sudden stopping from near top speed (lever release operation).



Support Blade on Both Sides

When using the blade as an outrigger, never support the machine with only one end of the blade.

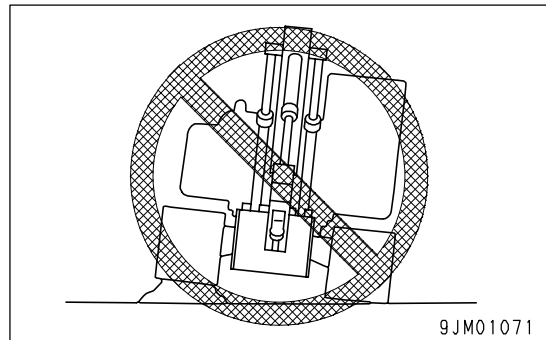


GENERAL OPERATION INFORMATION

Traveling

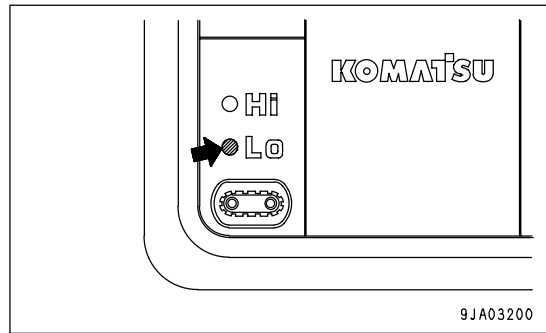
Traveling over boulders, tree stumps, or other obstacles will cause a big shock to the chassis (and in particular to the tracks), and this will cause damage to the machine. For this reason, always remove any obstacles or travel around them, or take other steps to avoid traveling over such obstacles as far as possible.

If there is no way to avoid traveling over an obstacle, reduce the travel speed, keep the work equipment close to the ground, and try to travel so that the center of the track passes over the obstacle.



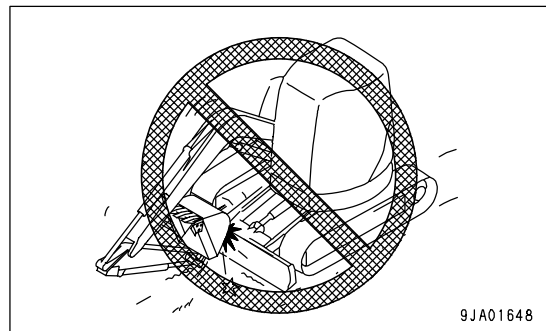
High Speed Travel

When traveling the machine on the rocky and rough ground or on a rough travel path strewn with stones, maintain slow speed (Lo lamp lights up). In traveling at high speed (Hi lamp lights up), meanwhile, travel the machine in such a way that the idlers face the traveling direction.



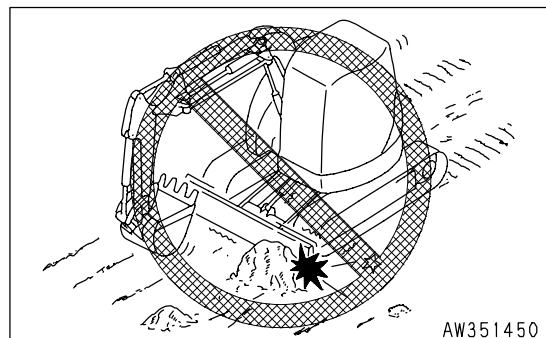
Folding In Work Equipment

When folding in the work equipment to the travel or transportation posture, be careful not to let the bucket hit the blade.



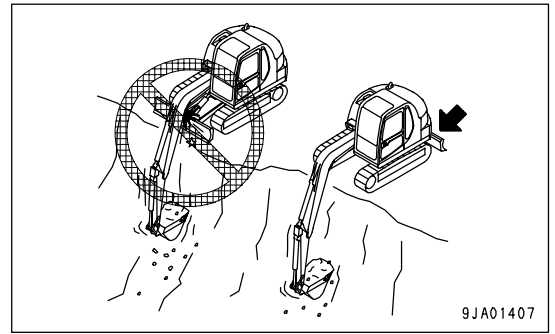
Avoid Hitting Blade

Be careful not to hit the blade against rocks or boulders. This will cause premature damage to the blade or cylinders.



Blade During Backhoe Operations

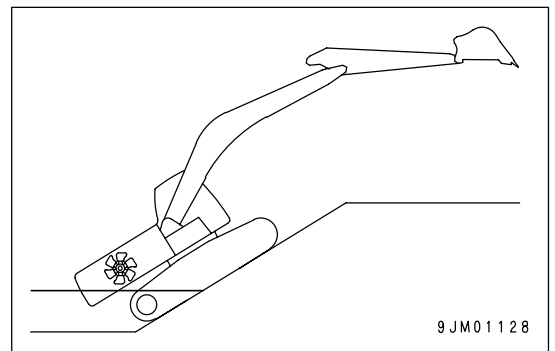
When carrying out deep digging operations with the blade at the front, be careful not to let the boom cylinder hit the blade. Always position the blade at the back unless it is needed at the front.



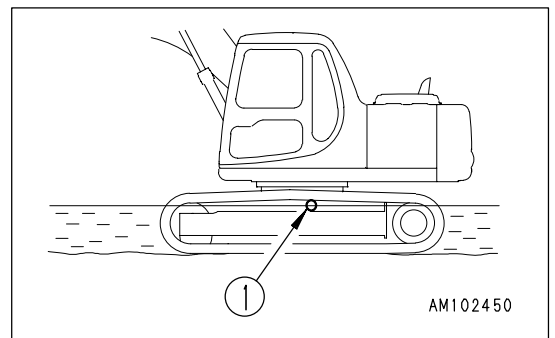
Permissible Water Depth

CAUTION

When driving the machine out of water, if the angle of the machine exceeds 15°, the rear of the upper structure will go under water, and water will be thrown up by the radiator fan. This may cause the fan to break. Be extremely careful when driving the machine out of water.



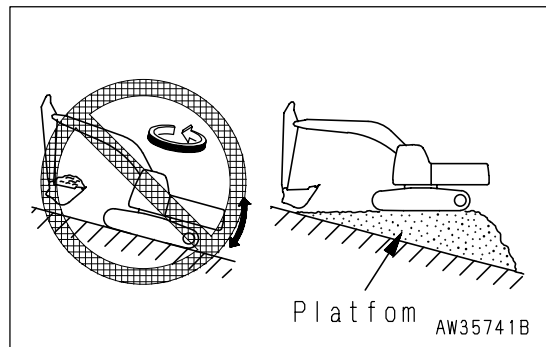
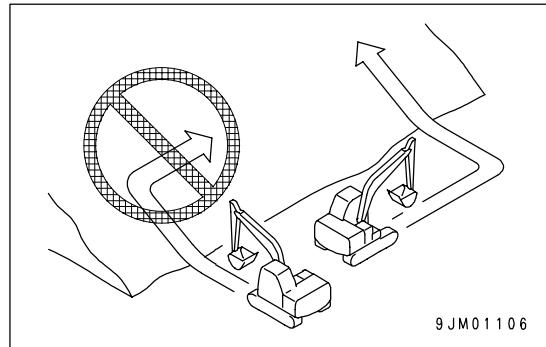
Do not immerse the machine in water by more than the permissible depth (under center of carrier roller (1)). In addition, for parts that have been immersed in water for a long time, pump in grease until the old grease comes out from the bearings. (Around the bucket pins)



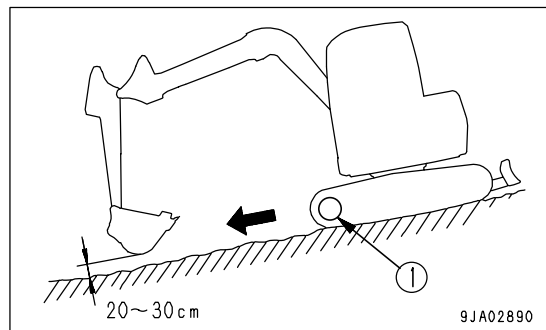
TRAVELING ON SLOPES

! WARNING

- Turning or operating the work equipment when working on slopes may cause the machine to lose its balance and turn over, so avoid such operations.
It is particularly dangerous to swing downhill when the bucket is loaded. If such operations have to be carried out, pile soil to make a platform on the slope so that the machine can be kept horizontal when operating.
- Do not travel up or down steep slopes. There is danger that the machine may turn over.
- When traveling, raise the bucket approx. 20 to 30cm (8 to 12 in) from the ground.
Do not travel downhill in reverse.
- Never turn on slopes or travel across slopes.
Always go down to a flat place to perform these operations. It may be longer, but it will ensure safety.
- Always operate or travel in such a way that it is possible to stop safely at any time if the machine slips or becomes unstable.
- When traveling uphill, if the shoes slip or it is impossible to travel uphill using only the force of the tracks, do not use the pulling force of the arm to help the machine travel uphill. There is danger that the machine may turn over.

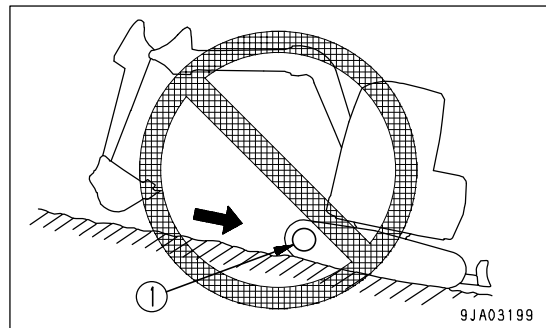


1. When traveling down steep hills, use the travel lever and fuel control dial to keep the travel speed low. When traveling down a steep hill of more than 15°, with the sprocket (1) side down, and set the work equipment to the posture shown in the diagram on the right, and lower the engine speed.

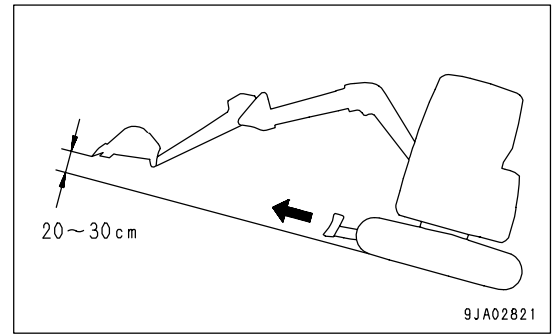


REMARK

Travel down hills with the sprocket (1) side down.
If the machine travels down with the sprocket (1) side up, the track tends to become loose, and that can cause skipping pitches.



2. When traveling up a steep hill of more than 15°, set the work equipment to the posture shown in the diagram on the right.



Traveling Downhill

Put the travel lever in the neutral position. This will cause the brake to be automatically applied.

Engine Stopped on Slope

If the engine stops when traveling uphill, move the travel levers to the neutral position, stop the machine, then start the engine again.

Cab Doors on Slope

- If the engine stops when the machine is on a slope, never use the left work equipment control lever to carry out swing operations. The upper structure will swing under its own weight.
- Do not open or close the sliding door on slopes when traveling or operating. The operating effort may change suddenly.
Always keep the sliding door locked.
- Be extremely careful when opening or closing the sliding door when the machine is stopped on a slope. There is danger that the weight of the door may cause it to open or close suddenly.

ESCAPE FROM MUD

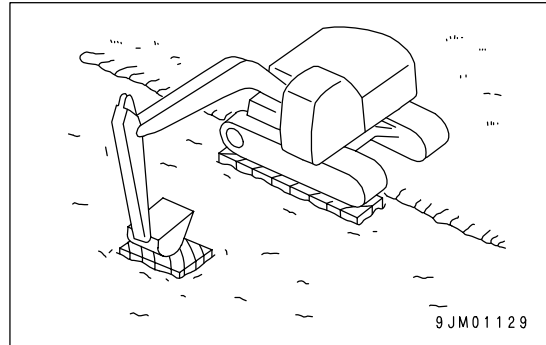
Always operate carefully to avoid getting affixed in mud. If the machine does get affixed in mud, do as follows to get the machine out.

Stuck One Side Of Track

NOTICE

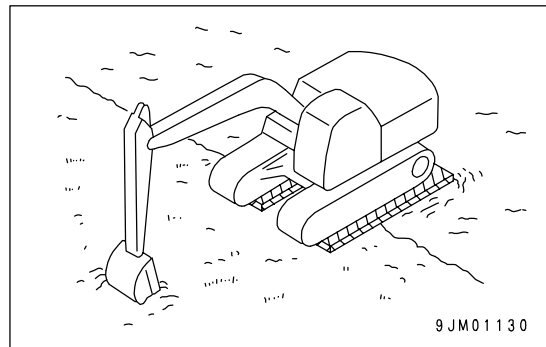
When using the boom or arm to raise the machine, always have the bottom of the bucket in contact with the ground. (Never push with the teeth). The angle between the boom and arm should be 90° to 110°. The same applies when using the inverting bucket.

When only one side is affixed in mud, use the bucket to raise the track, then lay boards or logs and drive the machine out.



Stuck Both Sides Of Tracks

If the track on both sides are in mud and the machine slips and cannot move, use the procedure given above to lay logs or timber. dig the bucket into the ground at the front, operate the arm in the same way as when digging, and set the travel lever to FORWARD to pull the machine out.



RECOMMENDED APPLICATIONS

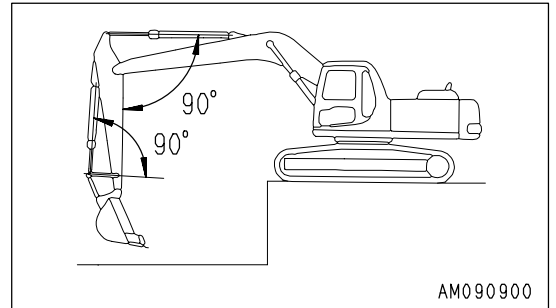
In addition to the following, it is possible to further increase the range of applications by using various attachments.

Backhoe Work

A backhoe is suitable for excavating at a position lower than the machine.

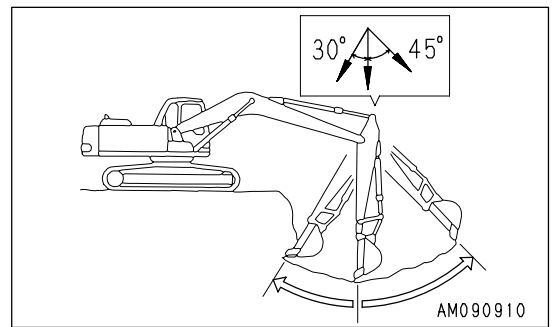
When the condition of the machine is as shown in the diagram at right, each cylinder's maximum pushing excavation force is obtained when the bucket cylinder and link, arm cylinder and arm are at 90°.

When excavating, use this angle effectively to optimize your work efficiency.



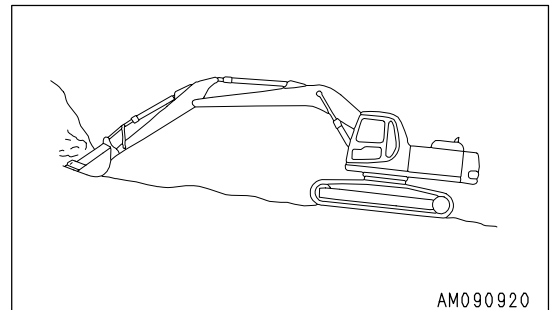
The range for excavating with the arm is from a 45° angle away from the machine to a 30° angle toward the machine.

There may be some differences depending on the digging depth, not try to keep within the above range rather than operating to the end of the cylinder stroke.



Shovel Work

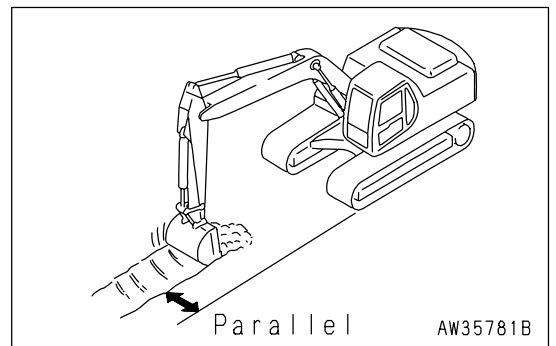
A shovel is suitable for excavating at a position higher than the machine. Shovel work is performed by attaching the bucket in the reverse direction.



Ditching Work

Ditching work can be performed efficiently by attaching a bucket which matches the digging operation and then setting the tracks parallel to the line of the ditch to be excavated.

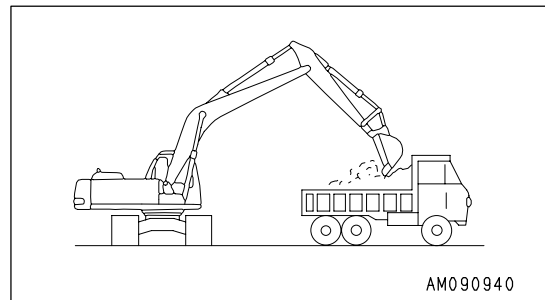
To excavate a wide ditch, first dig both sides and then finally remove the center portion.



Loading Work

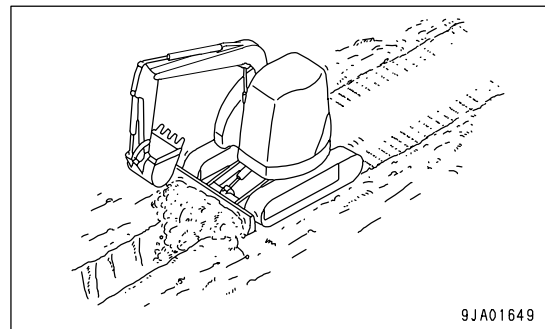
In places where the swing angle is small, work efficiency can be enhanced by locating the dump truck in a place easily visible to the operator.

Loading dump trucks is easier and the loading capacity is greater if the hydraulic excavator loads from the rear of the dump truck rather than from the side.



Refill And Finishing Work

When refilling after excavation and when smoothing the ground surface, use the blade.



BUCKET REPLACEMENT AND INVERSION

! WARNING

- When pins are knocked in with a hammer, pieces of metal may fly and cause serious injury. When carrying out this operation, always wear goggles, hard hat, gloves, and other protective equipment.
- When the bucket is removed, place it in a stable condition.
- If pins are hit with a strong force, there is a hazard that the pin may fly out and injure people in the surrounding area. Make sure that there is no one in the surrounding area before starting the operation.
- When removing the pins, do not stand behind the bucket. In addition, be extremely careful not to put your foot under the bucket while standing at the side for the work.
- When removing or inserting pins, be extremely careful not to get your fingers caught.
- Never insert your fingers into the pin holes when aligning the holes.

Stop the machine on a firm and flat surface and do the work. When performing joint work, appoint a conductor and follow that person's instructions and signals.

Replacement

1. Place the bucket in contact with a flat surface.

REMARK

When removing the pins, place the bucket so that it is in light contact with the ground. If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.

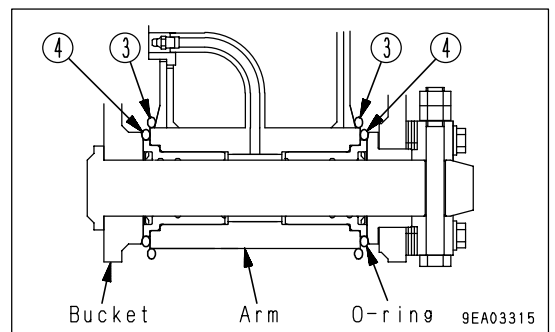
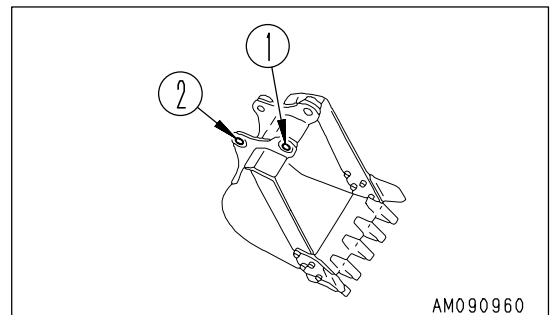
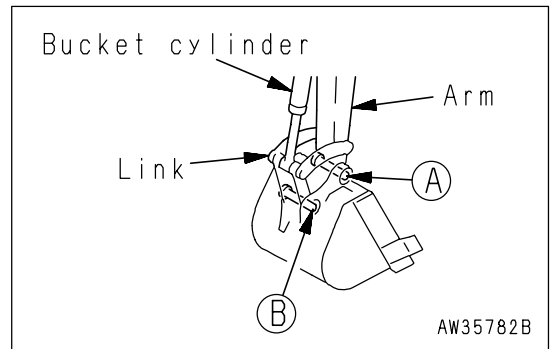
NOTICE

After removing the pins, make sure that mud or sand does not get on them. Dust seals are fitted at both ends of the bushings, so be careful not to damage them.

2. Remove the stopper bolts and nuts, then remove pins (A) and (B), and remove the bucket.
3. Align the arm with holes (1) of the replacement bucket and the link with holes (2), then insert grease-coated pins (A) and (B) into hole (1) and hole (2) respectively.

REMARK

- Install the bucket exactly in reverse order to dismantling.
- When installing the bucket, the O-rings are easily damaged, so fit the O-rings on the boss of the arm end as shown in the diagram (3) on the right. When knocking in the pins, move the O-ring down to the regular groove (4).

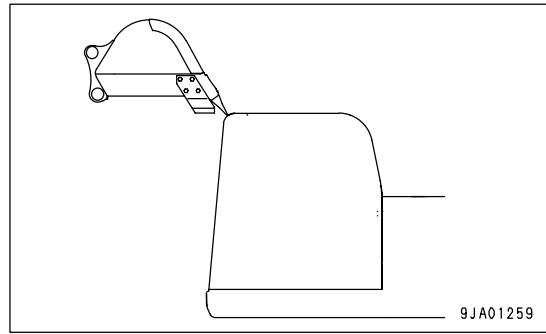


4. Install the stopper bolts and nuts for each pin, then grease the pin.

Inversion

! WARNING

When reversing a bucket, there is the danger that the bucket tooth tip overruns the normal trajectory and interferes with the cab, thus causing a serious trouble. Pay good attention to the work when reversing a bucket so that the bucket and the cab may not interfere with each other.

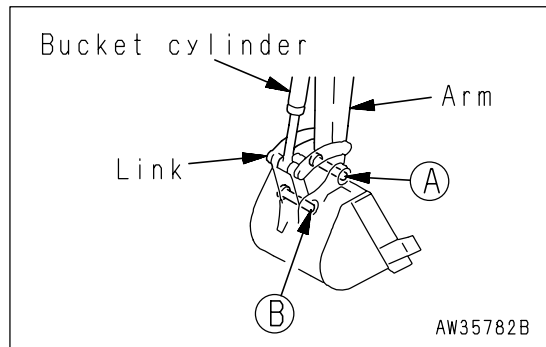


1. Place the bucket in contact with a flat surface.

REMARK

When removing the pins, place the bucket so that it is in light contact with the ground.

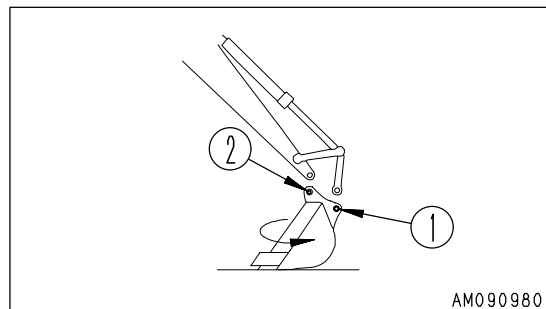
If the bucket is lowered strongly to the ground, the resistance will be increased and it will be difficult to remove the pins.



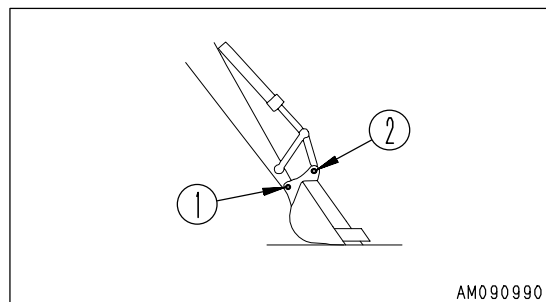
NOTICE

After removing the pins, make sure that mud or sand does not get on them. Dust seals are fitted at both ends of the bushings, so be careful not to damage them.

2. Remove the stopper bolts and nuts, then remove pins (A) and (B), and remove the bucket.



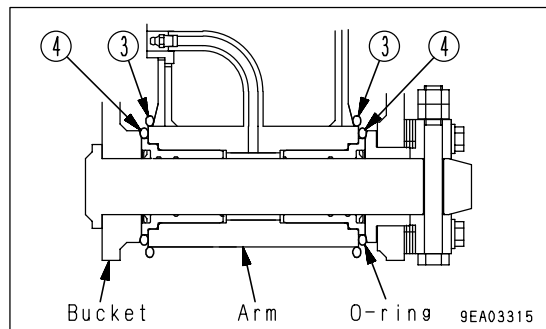
3. Turn the removed bucket. After turning the bucket, align the arm with link mounting hole (1), then align the link with arm mounting hole (2) and install.
4. Insert grease-coated pins (A) and (B) into hole (1) and hole (2) respectively.
5. Insert grease-coated pins (A) and (B) into hole (1) and hole (2) respectively.



REMARK

Install the O-ring into retaining hole (1) of the arm and bucket.

When installing the bucket, the O-rings are easily damaged, so fit the O-rings on the boss of the arm end as shown in the diagram (3) on the right. When knocking in the pins, move the O-ring down to the regular groove (4).

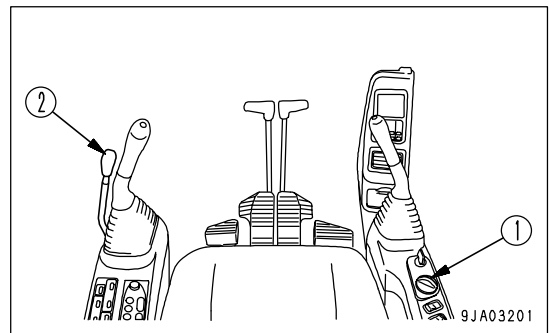
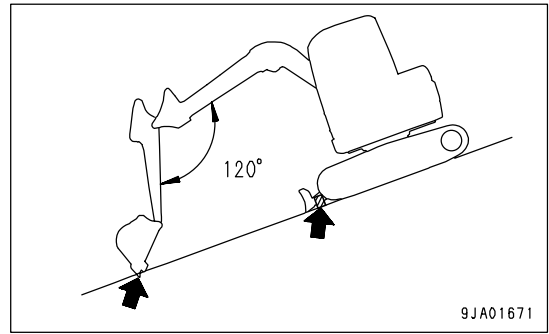


6. Install the stopper bolts and nuts for each pin, then grease the pin.

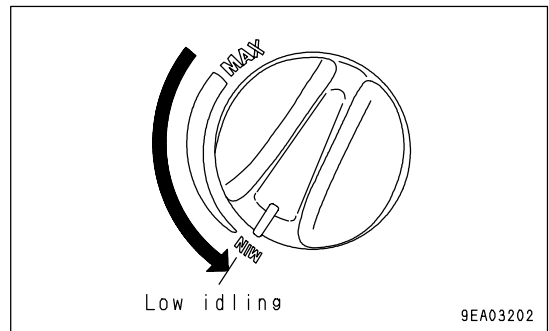
PARKING MACHINE

! WARNING

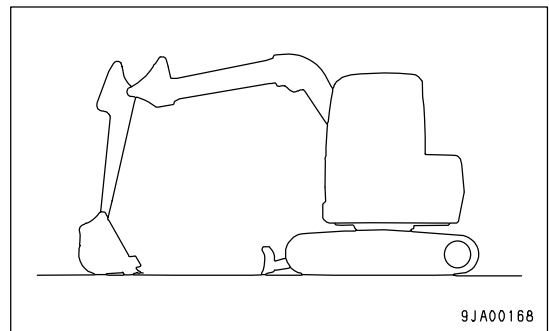
- Park the machine on the firm, level ground.
 Avoid parking the machine on slopes.
 If it is unavoidably necessary to park the machine on a slope, put blocks under the tracks and dig the work equipment into the ground surface to stop the machine from moving.
- If the control levers are touched by accident, the work equipment or machine may move suddenly, and this may lead to a serious accident.
 Before standing up from the operator's seat, always set the safety lock lever securely to the LOCK position.
- Set the blade on the downhill side and lower it to the ground.



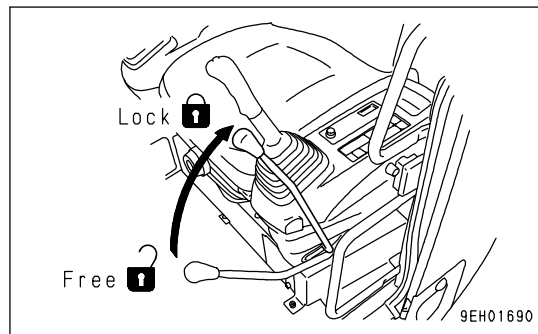
1. Stop the machine. For details, see "Stopping Machine (PAGE 3-84)".
2. Set fuel control dial (2) to the low idling position and lower the engine speed.



3. Lower the bucket horizontally until the bottom touches the ground.
4. Lower the blade to the ground.

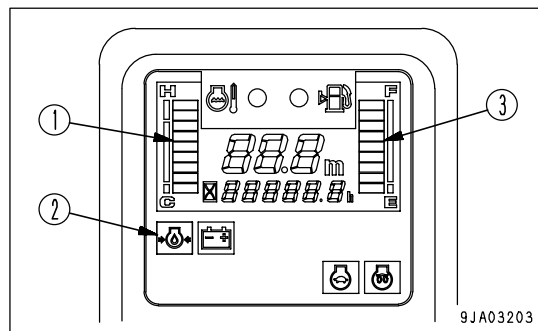


5. Set safety lock lever (2) in the LOCK position.



MACHINE INSPECTION AFTER DAILY WORK

Check the engine water temperature (1), engine oil pressure (2), and fuel level (3) on the machine monitor.



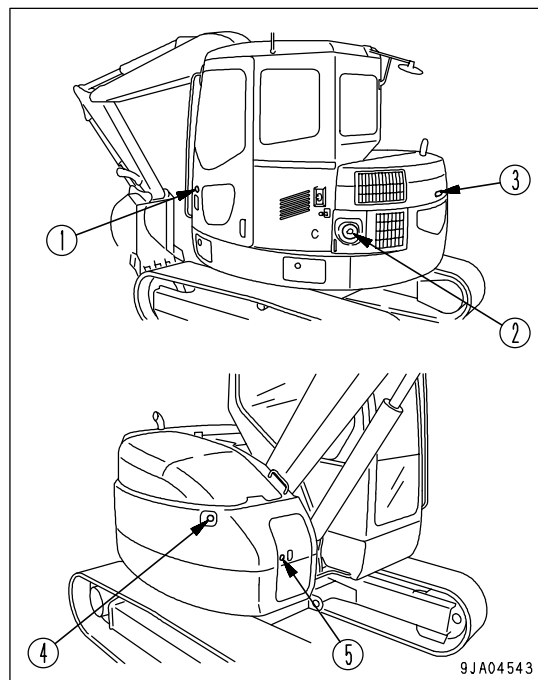
LOCKING

Always lock the following places.

- (1) Door of operator's cab
- (2) Fuel tank filler port
- (3) Engine hood
- (4) Mud cover
- (5) Battery inspection cover

REMARK

Use the starting switch key to open and close all these places.



ROAD LINERS AND RUBBER SHOES

(Machine equipped with road liner or rubber shoe)

Road Liners And Rubber Shoes Information

Road liners and rubber shoes have excellent properties that are not found in steel shoes. However, if they are used in the same way as steel shoes, full use cannot be made of their advantages.

Be sure to operate without straining the road liners and rubber shoes in a way that matched the conditions of the jobsite and the nature of the work.

Comparison Of Road Liners, Rubber Shoes and Steel shoes

	Road liner	Rubber shoe	Steel shoe
Little vibration	Excellent	Excellent	Average
Smooth travel (No creaks)	Good	Excellent	Good
Little noise	Excellent	Excellent	Average
No damage of paves surface	Excellent	Excellent	Average
Easy to handle	Average	Excellent	Average
Easily damage	Good	Average	Excellent
Strong drawber pull	Excellent	Excellent	Excellent

Considering the properties of the material used, road liners and rubber shoes offer various advantages. However, their weak point is lack of strength. Therefore, it is important to understand the advantages of road liners and rubber shoes, and to follow the precautions regarding handling and prohibited work. This will extend the life of the road liners and rubber shoes and will enable the machine to display the advantages of road liners and rubber shoes to the maximum. Before using road liners and rubber shoes, always read "Using Road Liners And Rubber Shoes (PAGE 3-104)".

Warranty For Road Liners And Rubber Shoes

It is important to inspect and maintain the tracks at the correct tension. Furthermore, these shoes must not be used near objects where they are likely to suffer damage, such as the corners of steel plates, U-shaped ditch liners, blocks, on crushed rock or the sharp edges of rocks, iron beams, or scrap iron.

Any damage resulting from the customer's mistaken use of the machine shall not be included in the scope of the warranty.

Using Road Liners And Rubber Shoes

Prohibited Works

Do not carry out the following types of work.

- Carrying out operations and steering on crushed rock, extremely rough hard rock, steel beams, scrap iron, or near the edges of steel plates will cause damage to the road liners and rubber shoes.
- In places such as river beds where there are large numbers of large and small boulders, the stones may get caught and damage the road liners and rubber shoes or make the shoes come off. If dozing operations are carried out when the shoes are slipping, this will reduce the life of the road liners and rubber shoes.
- Be careful not to get oil, fuel, or chemical solvent on the road liners and rubber shoes. If such a substance should get on the shoes, remove it immediately. Furthermore, do not travel on road surfaces where oil has collected.
- When putting the machine into long-term storage (3 months or more), store the machine indoors where it is protected from direct sunlight or rain.
- Do not use the machine in high-temperature areas, such as areas where there is burning wood, steel plates that have been left under the hot sun, or places where asphalt has been laid.
- Do not move the machine with the crawler on one side raised using the work equipment. This will cause damage to the rubber shoes and may cause the rubber shoes to come off.
- When the rubber parts of the road liner are so worn or broken that the head of the mounting bolts are scratched, replace the shoe immediately. If the bolt heads are broken, the bolt cannot be removed.
- When installing road liners, always install them to all links on both sides. If they are installed to only one part of the links, their durability will be greatly reduced.

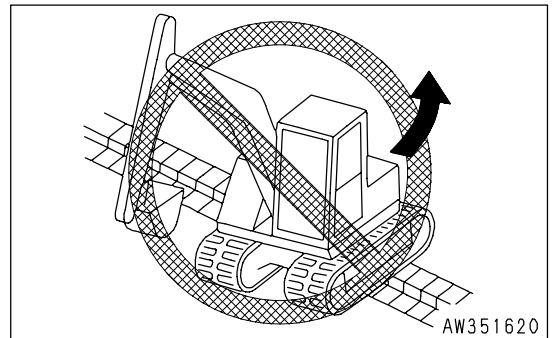
Long Life Operations

Be careful of the following points when carrying out work.

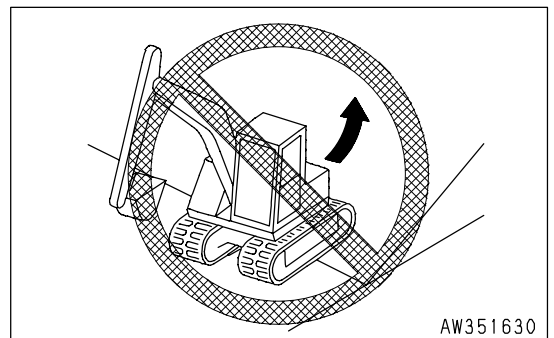
- Avoid carrying out counterrotation turns on concrete surfaces. There is danger that the concrete surface will scrape off the rubber from the shoe.
- Avoid making sudden changes in direction. This may cause premature wear or damage to the road liners and rubber shoes.
- Avoid operating the steering when traveling over places where there is a big difference in height. When traveling over obstacles or places where there is a difference in height, drive the machine at right angles to the obstacle to prevent the shoes from coming off.
- If the machine has been raised using the bucket, lower it slowly.
- Avoid doing work with materials that produce oil when crushed (soya beans, corn, or remains of vegetables squeezed for oil); or wash the machine after use.
- Avoid handling materials that will attack the adhesion of the steel core, such as salt, ammonium sulphate, potassium chloride, potassium sulphate, or calcium superphosphate; or wash the machine after use.
- The adhesion of the core will be attacked by salt, so avoid using the machine in coastal areas.
- When handling salt, sugar, wheat, or soybeans, if there is any deep cut in the road liners and rubber shoes, these substances may get into the lugs or cut portion of the rubber. Always repair the rubber before use.
- Do not carry out work that involves scraping against walls or concrete embankments.
- Road liners and rubber shoes slip extremely easily on snow or frozen roads. Be careful not to slip when traveling or working on slopes.
- The properties of road liners and rubber shoes change when working in extremely cold places, and this will reduce the life of the road liners and rubber shoes.
- Because of the properties of rubber, use the road liners and rubber shoes within a range of -25°C to +65°C (-13°F to +149°F).
- When carrying out bucket operations, be careful not to damage the road liners and rubber shoes with the bucket.

- Always maintain the rubber shoes at the proper tension to prevent them from coming off. If the tension is low, the rubber shoes will come off under the following conditions. Even if the tension is correct, be extremely careful when carrying out operations.

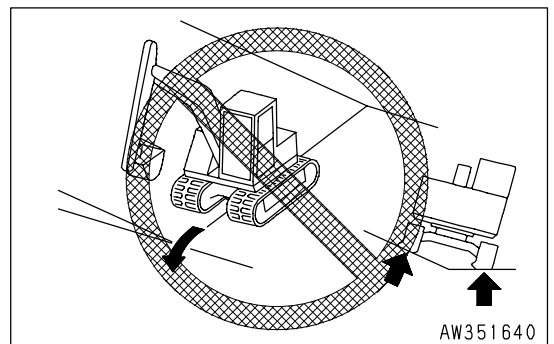
1. Avoid operating the steering when traveling over curbs, rocks, or places where there is a big difference in height (more than approx. 20cm (8 in)). When traveling over such objects, always travel at right angles to the object.



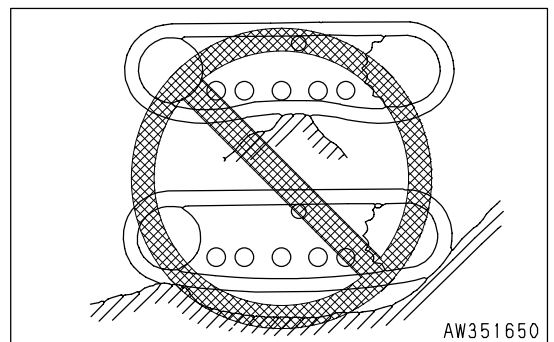
2. When traveling in reverse up a slope, do not turn when moving from flat ground onto the slope. If it is necessary to turn on slopes, be sure to turn gradually.



3. Avoid traveling along the edge of slopes or on rough ground with the track on one side raised (with the machine tilting at an angle of more than approx. 10°) and with the track on the other side on flat ground. To avoid damage to the road liners and rubber shoes, travel with the tracks on both sides on flat ground.

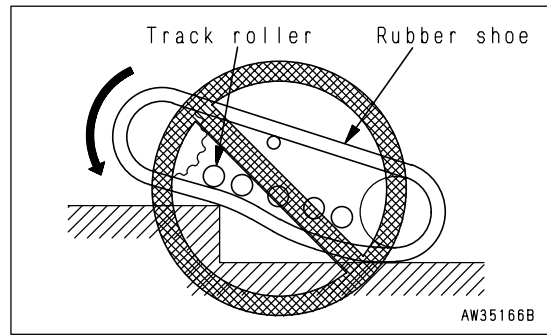


4. If the machine is operated as explained in 1 to 3 above, the rubber shoes is slackened. Do not steer the machine in the positions shown in the figure.

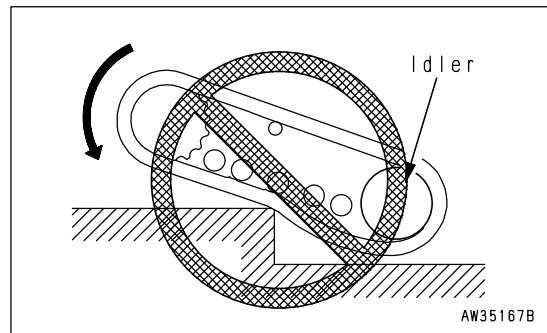


Mechanism of rubber shoe coming off track

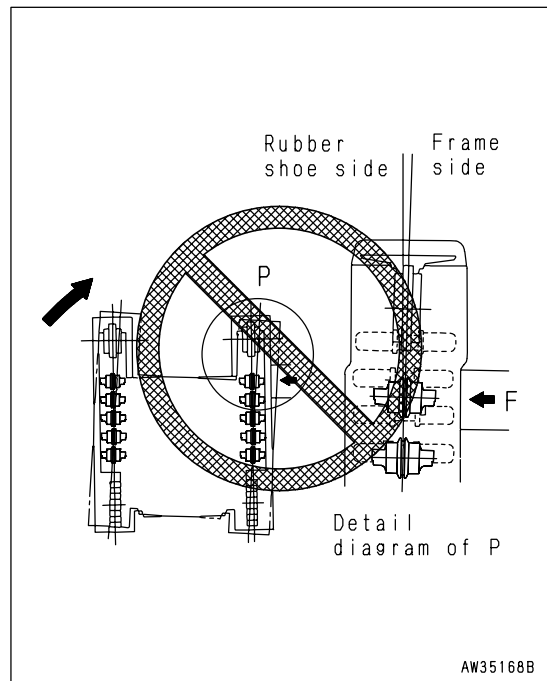
1) When traveling over an obstacle, a gap is formed between the track roller and the rubber shoe. In this condition, the rubber shoe may come off.



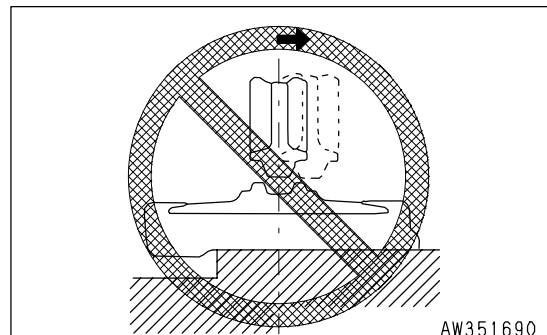
2) Furthermore, if the machine travels in reverse, a gap is formed between the track roller, idler, and rubber shoe.



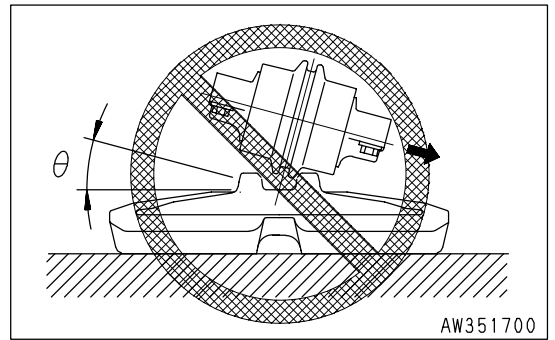
- When turning in a condition where the rubber shoe cannot move to the side because of the object it is passing over, or because of some other object.
- When the rubber shoe has moved out of alignment and the idler or track roller are not aligned with the core.



- If the machine travels in reverse in this condition, the rubber shoe will come off.



- If the machine is turned in this condition, the rubber shoe will come off.



TRANSPORTATION

When transporting the machine, observe all related laws and regulations, and be careful to assure safety.

TRANSPORTATION PROCEDURE

As a basic rule, transport the machine by trailer.

Select the trailer to match the weight and dimensions given in "SPECIFICATIONS (PAGE 5-2)".

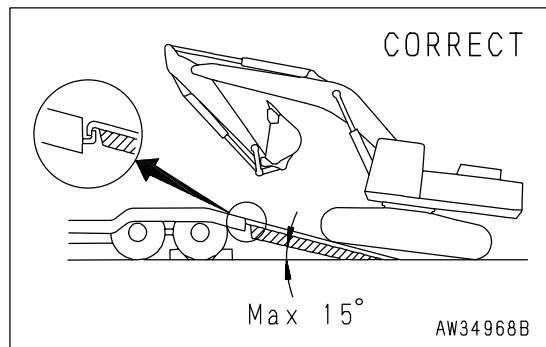
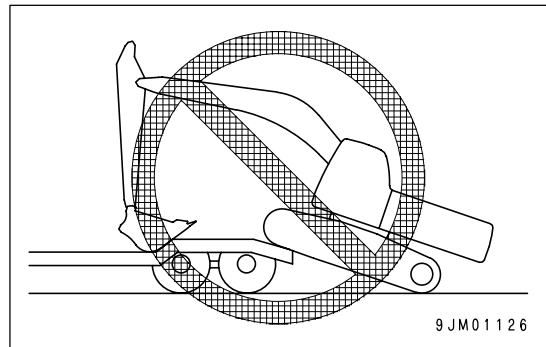
Note that the value for the weight and transportation dimensions given in SPECIFICATIONS may differ according to the type of shoe or type of arm or other attachments.

LOADING AND UNLOADING WITH TRAILER



WARNING

- When loading a machine to a trailer or unloading from it, be sure to travel the machine at low speed. Never attempt to change the speed or depress the accelerator.
- Run the engine at low idling, set to low speed, and operate the machine slowly when loading or unloading.
- Select firm, level ground when loading or unloading the machine. Maintain a safe distance from the edge of the road.
- Use ramps with ample width, length, thickness, and strength and install them at a maximum slope of 15°.
 - When using piled soil, compact the piled soil fully and take action to prevent the slope face from collapsing.
- Remove all mud and dirt from the machine tracks before starting in order to prevent the machine from slipping on the ramps. Be sure that the ramp surface is clean and free of water, snow, ice, grease, or oil.
- Never correct your steering on the ramps. There is danger that the machine may turn over.
 - If necessary, drive off the ramps, correct the direction, then enter the ramps again.
- Do not use the work equipment for loading and unloading operations. It is dangerous.
- When on the ramps, do not operate any lever except the travel lever.
- The center of gravity of the machine will change suddenly at the joint between the ramps and the track or trailer, and there is danger of the machine losing its balance. Travel slowly over this point.
- When swinging the upper structure on the trailer, the trailer is unstable, so pull in the work equipment and swing slowly.
- If the sliding door of the cab is closed or open, always check that it is locked in position. The operating effort when opening or closing the door suddenly changes when the machine is on a ramp or platform, so never open or close the door in such conditions.



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. Properly apply the brakes on the trailer and put detents under the tires to ensure that the trailer does not move.

Then fix the ramps in line with the center of the trailer and the machine.

Be sure that the two sides are on the same level.

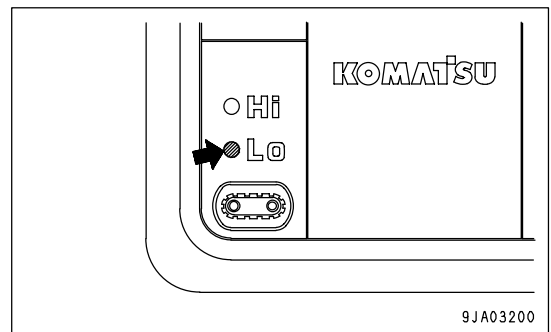
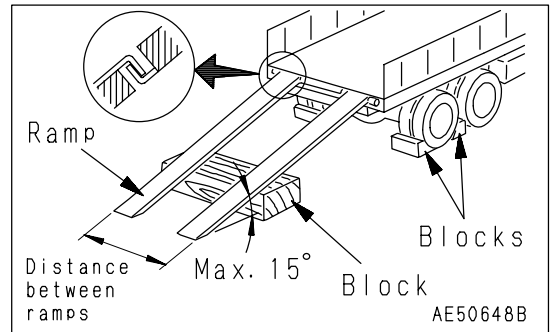
Make the slope of the ramps a maximum of 15°.

Set the distance between the ramps to match the center of the tracks.

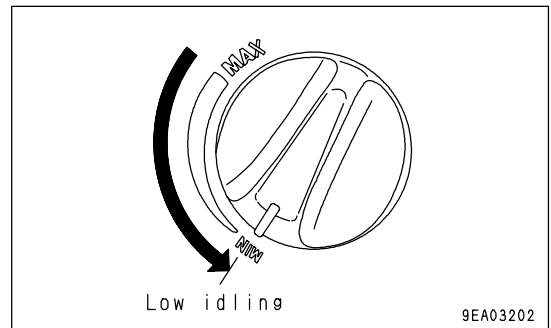
Properly apply the brakes on the trailer and put blocks under the tires to ensure that the trailer does not move.

Make the slope of the ramps a maximum of 15°.

3. Turn the travel speed selector switch to low speed travel (Lo lamp lights up).



4. Run the engine at low speed.

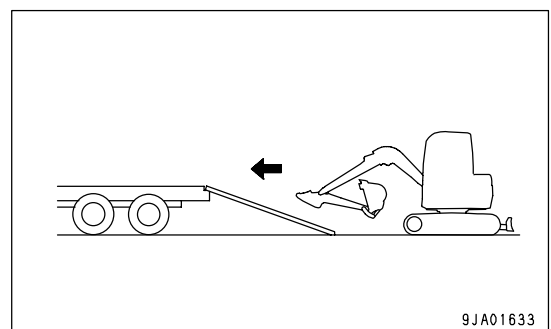


5. When loading, set the work equipment at the front and the blade at the rear, with the undercarriage and upper structure set parallel.

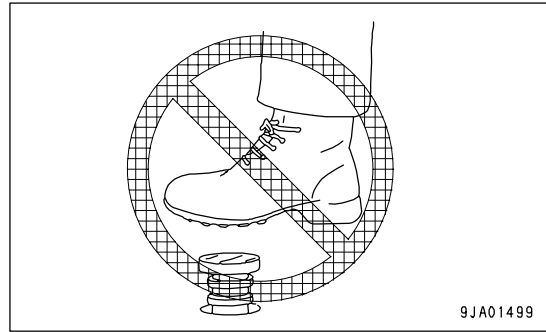
6. Before moving onto the ramps, make sure that the machine is positioned in a straight line with the ramps and that the centerline of the machine matches that of the trailer.

Align the direction of travel with the ramps and travel slowly. Lower the work equipment as far as possible without causing interference.

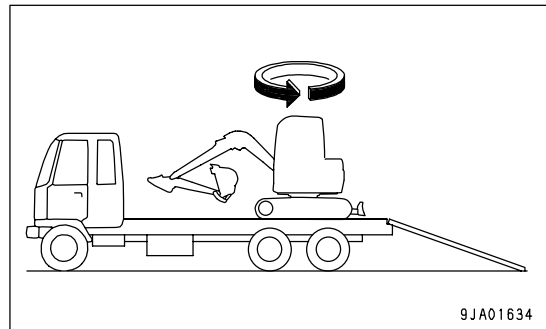
When on the ramps, operate only the travel lever. Do not operate any other lever.



7. Do not operate the accelerator pedal.



8. Stop the machine at the specified place, then swing the upper structure slowly 180°.



9. Stop the machine at the specified position on the trailer.

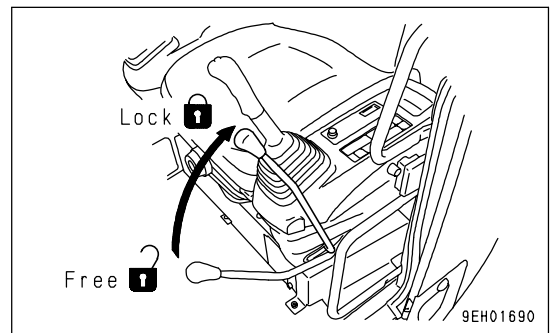
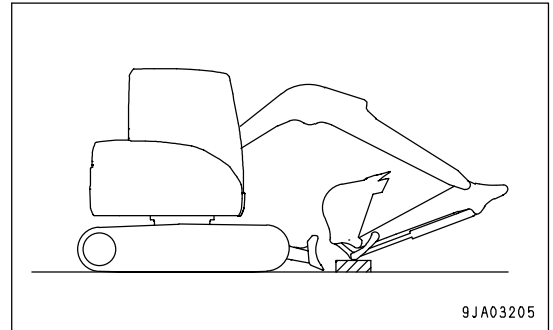
Securing Machine

After placing the machine on the specified position of the trailer, secure it according to the following procedure.

NOTICE

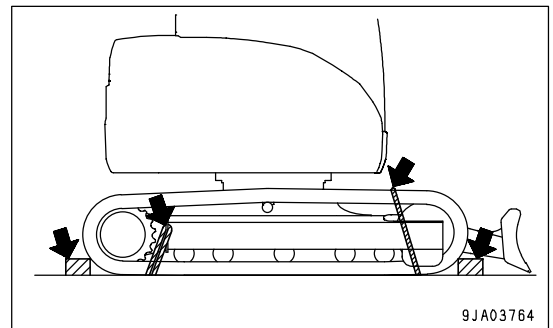
To prevent damage to the bucket cylinder during transportation, fit a wooden block at one end of the bucket cylinder to prevent it from touching the floor.

1. Lower the blade.
2. Extend the bucket and arm cylinders fully, then lower the boom slowly.
3. Stop the engine, then remove the key from the starting switch.
4. Lock each control lever with the safety lock lever securely.



5. Lock the sliding door (cab specification) and covers with locks.
6. Put blocks under both ends of the tracks to prevent the machine from moving during transportation, and tie the machine down securely with chains or wire rope of suitable strength.

Be particularly careful to fix the machine in position securely so that it does not slip to the side.



Unloading

1. Perform loading and unloading on firm, level ground only. Maintain a safe distance from the edge of a road.

2. Properly apply the brakes on the trailer and put blocks under the tires to ensure that the trailer does not move.

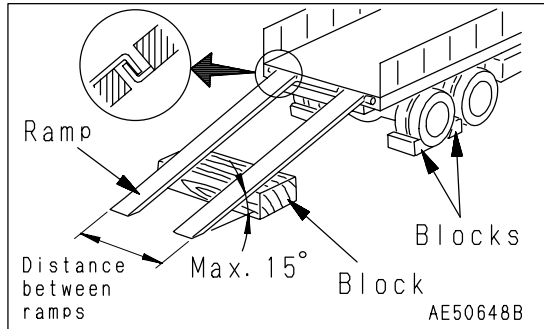
Before moving onto the ramps, make sure that the machine is positioned in a straight line with the ramps and that the centerline of the machine matches that of the trailer.

Make the slope of the ramps a maximum of 15°.

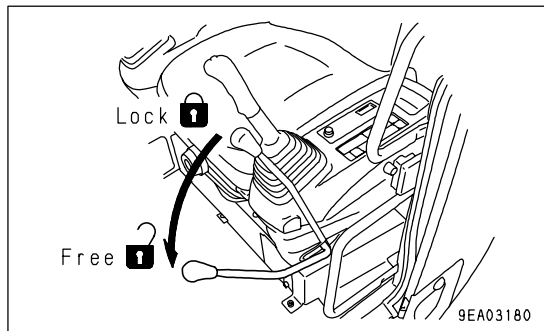
3. Remove the chains and wire ropes fastening the machine.

4. Start the engine.

Warm the engine up fully.

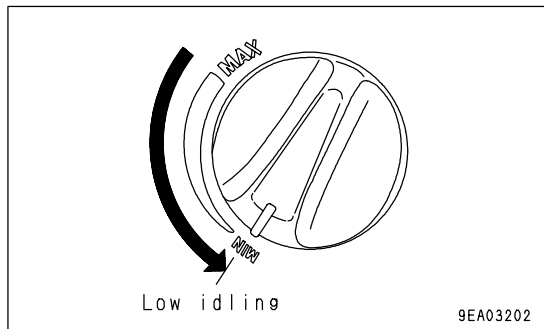


5. Set the safety lock lever to the FREE position.

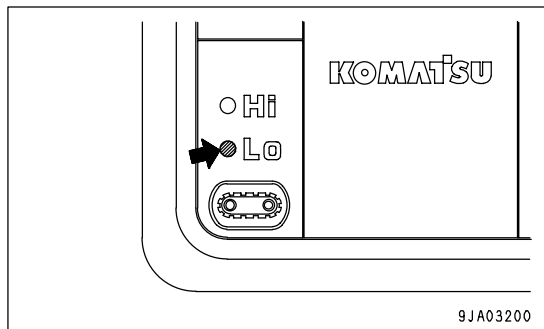


6. Run the engine at low speed.

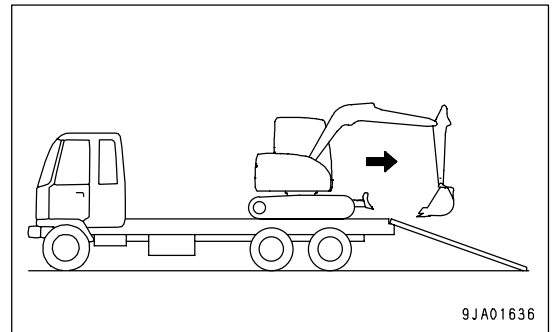
7. Raise the blade.



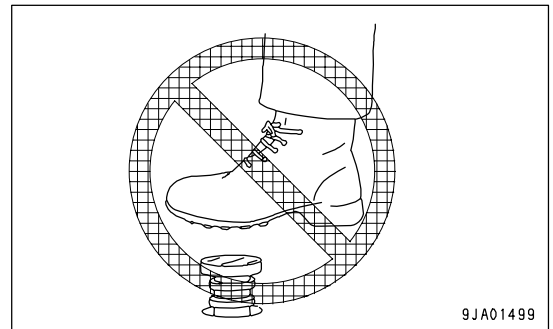
8. Turn the travel speed selector switch to low speed travel (Lo lamp lights up).



9. Raise the work equipment, align the direction of travel with the ramp, and travel slowly.
Lower the work equipment as far as possible without causing interference.
When on the ramps, operate only the travel lever. Do not operate any other lever or pedal.



10. Do not operate the accelerator pedal.



LIFTING MACHINE



WARNING

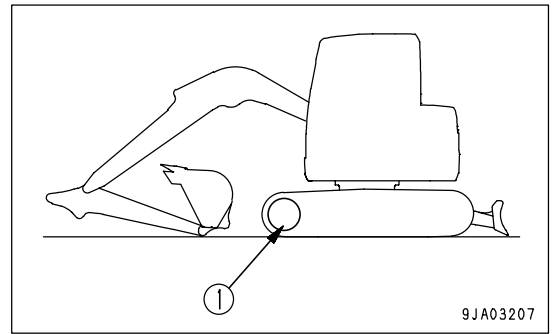
- Never raise the machine with any worker on it.
- Always make sure that the wire rope used for lifting the machine is of ample strength for the weight of the machine.
- Never lift the machine with the upper structure swung to the side. Swing the work equipment so that it is at the sprocket end and set the undercarriage and upper structure parallel before lifting.
- When lifting, keep the machine horizontal.
- Never go under the machine when it is raised.
- Never try to lift the machine in any posture other than the posture given in the procedure below.
There is a hazard that the machine may lose its balance.

NOTICE

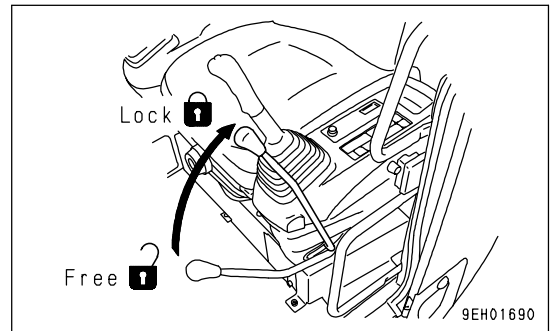
- For the details on the machine weight, see the section of "SPECIFICATIONS (PAGE 5-2)".
- The lifting procedure applies to machines with standard specifications.
The method of lifting differs according to the attachments and options actually installed. In such cases, please contact your Komatsu distributor for information.

When lifting the machine, carry out the operation on flat ground as follows.

1. Start the engine, then swing the upper structure so that the work equipment is at sprocket (1) end with the track frame and upper structure set parallel.
2. Extend the bucket cylinder and arm cylinder fully, then lower the work equipment to the ground as shown in the diagram on the right using the boom cylinder.
3. Lower the blade to the ground.



4. Operate the safety lock lever to the LOCK position.

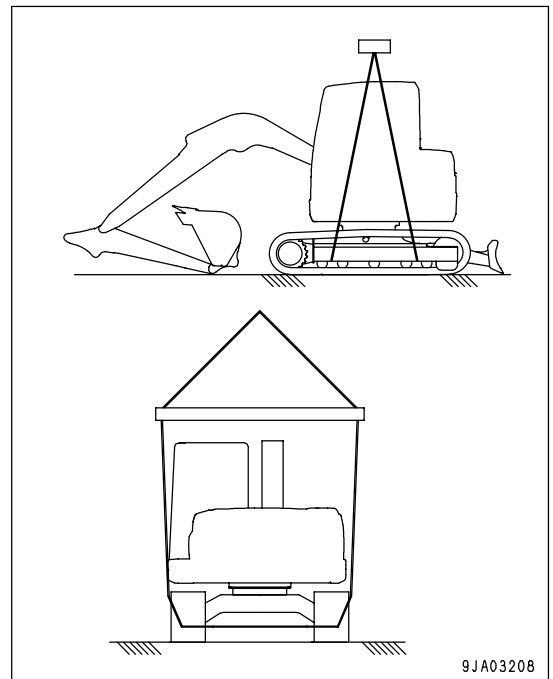


5. Stop the engine, check that there is nothing around the operator's compartment, then get off the machine. Close the cab door and front glass securely.
6. Pass wire ropes between the 1st and 2nd track rollers from the front and between the 1st and 2nd track rollers from the rear.

NOTICE

Do not attempt to lift up the machine by hanging a wire rope to the bracket that is provided for fastening the machine in transportation. Such a practice will damage the machine.

7. Set the lifting angle of the wire rope to 30° to 40°, then lift the machine slowly.
8. After the machine comes off the ground, check the hook condition and the lifting posture, and then lift slowly.



COLD WEATHER OPERATION

COLD WEATHER OPERATION INFORMATION

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, FUEL AND COOLANT SPECIFICATIONS (PAGE 4-8)".

Cooling System 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 amount of fresh water and see a doctor at once.**
- **When changing the coolant or when handling coolant containing antifreeze that has been drained when repairing the radiator, please contact your Komatsu distributor. Antifreeze is toxic, so do not let it flow into drainage ditches or spray it 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.**
- **Never use any water-leakage prevention agent or any antifreeze containing such an agent.**
- **Do not mix different types of antifreeze.**

For details of the antifreeze mixture when changing the coolant, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 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 amount 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.
- Battery electrolyte is toxic, so do not let it flow into drainage ditches or spray it on to the ground surface.

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)	20	0	-10	-20
Charging Rate(%)				
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.

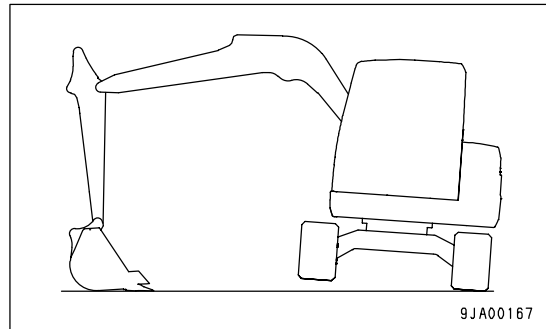
AFTER DAILY WORK COMPLETION

WARNING

- Performing idle-running of the tracks is dangerous, so stay well away from the tracks.

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.

- Remove all the mud and water from the machine body. In particular, wipe the hydraulic cylinder rod clean to prevent damage to the seal caused by mud or dirt on the rod surface getting inside the seal together with 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.
- Fill the fuel tank to the full in order to prevent moisture from forming dew in the tank room, as the ambient temperature goes down.
- After operation in water or mud, remove water from undercarriage as described below to extend undercarriage service life.
 1. Swing 90° with engine at low idling and bring the work equipment to the side of the track.
 2. Jack up the machine until the track is raised slightly from the ground. Rotate the track under no load. Repeat this procedure on both the left and right sides.



AFTER COLD WEATHER SEASON

When season changes and the weather becomes warmer, do as follows.

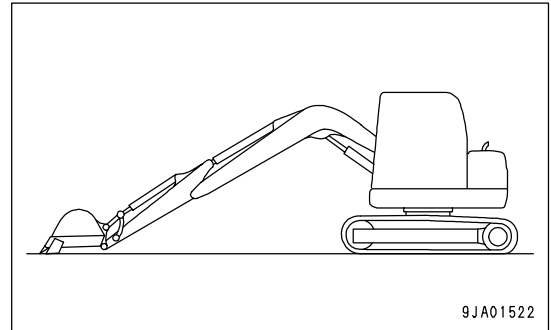
- Replace the fuel and oil for all parts with oil of the viscosity specified.
For details, see "LUBRICANTS, FUEL AND COOLANT SPECIFICATIONS (PAGE 4-8)".
- If for any reason permanent antifreeze cannot be used, and an ethyl glycol base antifreeze (winter, one season type) is used instead, or if no antifreeze is used, drain the cooling system completely, then clean out the inside of the cooling system thoroughly, and fill with fresh soft water.

LONG TERM STORAGE

BEFORE STORAGE

NOTICE

To protect the hydraulic cylinder piston rod while in storage, keep the work equipment in the posture shown at right.
(This prevents rust from developing on the piston rod)



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.
- Lock each control lever and pedal with the safety lock lever and pedal lock.
- Set the stop valve to the "lock" position on machines ready for attachments. Install the blind plugs to the elbows.
- Set the selector valve on the machines which can install attachments to the "Crusher or general attachment" position.

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.

Operate the engine and move the machine for a short distance 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.

- For machines equipped with an air conditioner, run the air conditioner.
- Rotate the tracks.

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.

TRoubles AND ACTIONS

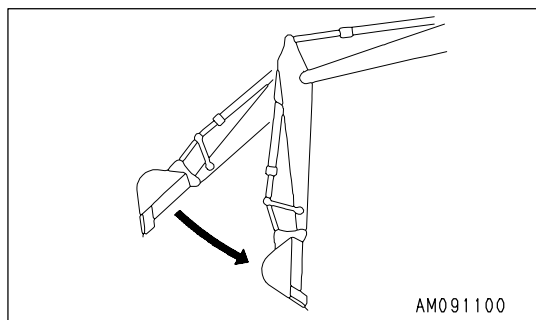
RUNNING OUT OF FUEL

When starting after running out of fuel, fill with fuel and bleed the air from the fuel system before starting. For details of bleeding the air, see "Air Bleeding (PAGE 4-59)".

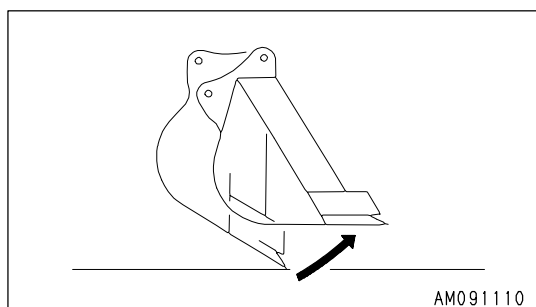
PHENOMENA THAT ARE NOT FAILURES

Note that the following phenomena are not failures:

- When the arm control lever is operated to the IN position and the work equipment is lowered under no load from a high position, the arm speed will drop momentarily when the arm is more or less at the vertical position.



- When the bucket control lever is operated to the CURL position and the work equipment is lowered under no load from a high position, the bucket speed will drop momentarily when the bucket teeth are more or less at the horizontal position.



- When starting or stopping the swing, noise will be emitted from the brake valve.
- When going down a steep slope at low speed, a noise will be emitted from the travel motor brake valve.

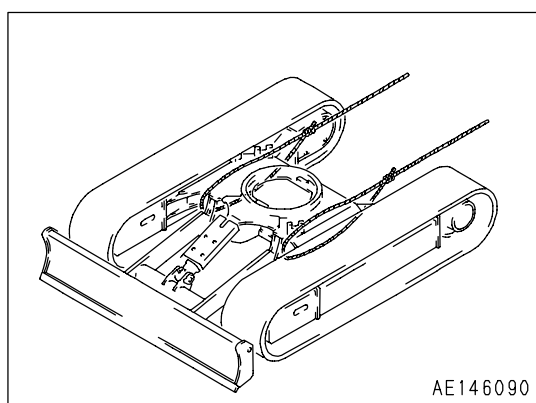
TOWING THE MACHINE

! WARNING

- When towing the machine, use a wire rope that has ample strength for the weight of the machine that is being towed.
- Do not apply a sudden load to the wire rope.

If the machine sinks in mud and cannot get out under its own power, or if the drawbar pull of the excavator is being used to tow a heavy object, use a wire rope as shown in the diagram on the right.

Places pieces of wood between the wire ropes and the body to prevent the wire ropes from damaging the body.



SEVERE JOB CONDITION

- When carrying out digging operations in water, if the work equipment mounting pin goes into the water, carry out greasing every time the operation is carried out.
- For heavy-duty operations and deep digging, carry out greasing of the work equipment mounting pins every time before operation.

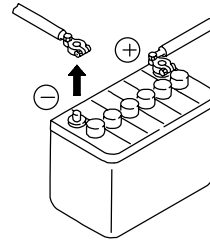
After greasing, operate the boom, arm, bucket, and blade (machine equipped with blade) several times, then grease again.

DISCHARGED BATTERY

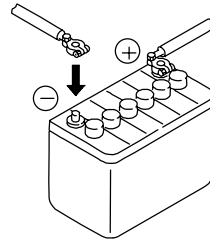
**WARNING**

- It is dangerous to charge the battery as it is mounted on the machine. Do not attempt that.
- Before checking or handling the battery, turn the engine starting switch key OFF.
- The battery generates hydrogen gas, so there is a hazard of explosion. Do not bring lighted cigarettes or open flames near the battery, or do not do anything that will cause sparks.
- Battery electrolyte is dilute sulfuric acid, and it can attack your clothes and skin. If it gets on your clothes or skin, wash it immediately with a large amount of fresh water. If it gets in your eyes, wash it out with fresh water immediately and consult a doctor.
- When handling batteries, always wear protective goggles and rubber gloves.
- When removing the battery, first disconnect the cable from the grounding terminal (normally the negative (-) terminal). When installing the battery, connect the positive (+) terminal first.
If a metallic tool touches the positive (+) terminal and the chassis like a connecting cable by accident, there is danger that it will cause a spark. Take good care to avoid such an accident.
- If the terminals are loosened, there is danger that the faulty contact may generate sparks which in turn leads to explosion. When connecting cables, fix the terminals securely.
- When removing or installing the terminals, be sure which terminal is positive (+) and which terminal is negative (-).

When removing, disconnect the cable from the ground terminal first.



When installing, connect the cable to the positive (+) terminal first.

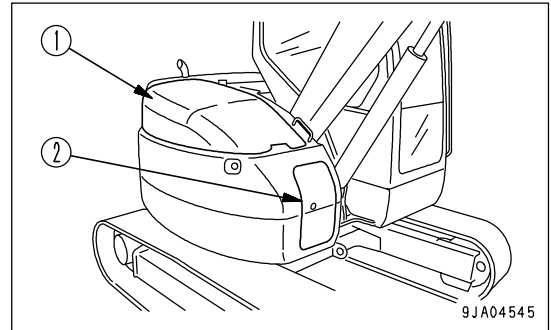


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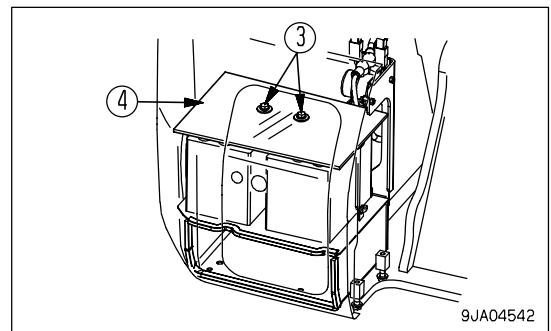
Battery Removal And Installation

Removal of Battery

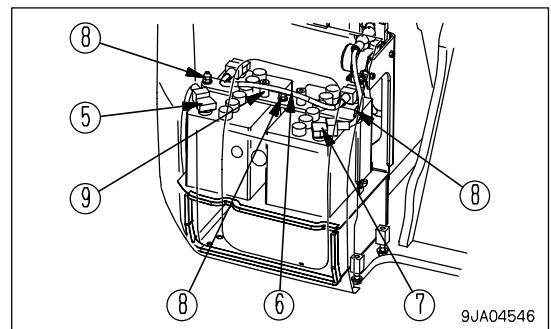
1. Open up dust cover (1) and battery inspection cover (2).



2. Loosen bolts (3) to remove sheet (4) installed above the battery.



3. Disconnect cable (5) from the negative (-) terminal (grounding side) first.
4. Disconnect connection cable (6) and cable (7) from the positive (+) terminal.
5. Loosen securing nuts (8) to remove fixtures (9).
6. Take out the battery through battery inspection cover (2).



Installing of battery

NOTICE

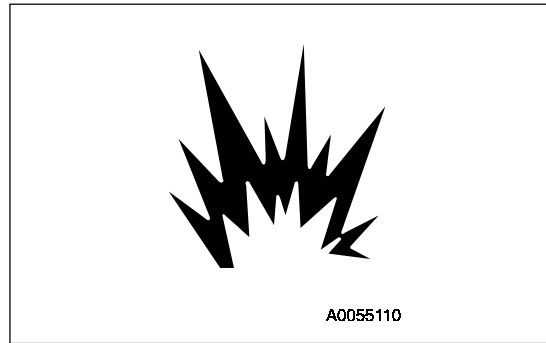
After securing the battery, check that it does not move. If it moves, tighten it again securely.

1. Place the battery in the specified position.
2. Fasten the battery firmly with fixtures (9) and securing nuts (8).
 Securing nut tightening torque
 1st nut: 4.9 to 5.9 N·m (0.5 to 0.6 kgf·m, 3.6 to 4.3 lbft)
 Between nuts: 58.8 to 73.5 N·m (6.0 to 7.5 kgf·m, 43.4 to 54.2 lbft)
3. Connect cable (7) to the positive (+) terminal of the battery.
4. Connect connecting cable (6) first to the positive (+) terminal of the battery.
5. Connect cable (5) to the negative terminal (-) (grounding side).
6. Install sheet (4).
7. Close battery inspection cover (2) and dust cover (1).

Battery Charges

When charging the battery, if the battery is not handled correctly, there is a hazard that the battery may explode. Always follow the instructions of "DISCHARGED BATTERY (PAGE 3-122)" and the instruction manual accompanying the charger, and do as follows.

- 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.
- 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.



Starting Engine With Booster Cables

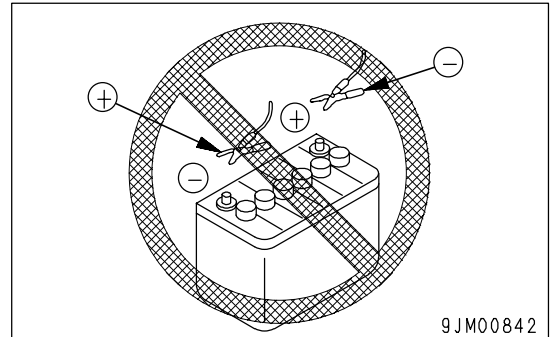
When starting the engine with a booster cable, do as follows:

Connecting and Disconnecting Booster Cables



WARNING

- When connecting the cables, never contact the positive (+) and negative (-) terminals.
- When starting the engine with a booster cable, always wear safety glasses.
- 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. If hydrogen gas explodes, it could cause serious injury.
- Be careful not to make a mistake when connecting a booster cable. In the last connection (to the upper structure frame), a spark will be caused, so connect the cable to a spot as far away from the battery as possible. (Avoid the work equipment, however, because it is not a good conductor)
- ?When removing the booster cable, exercise good care so that the booster cable clips may not contact each other, or they contact the chassis.



NOTICE

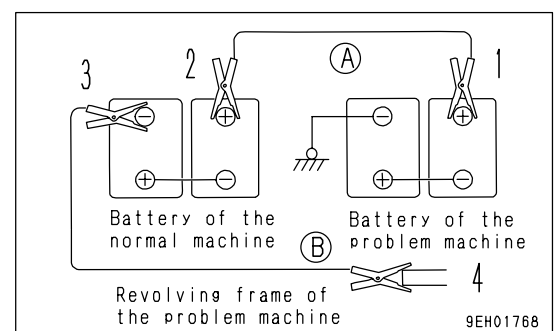
- The size of the booster cable and clip should be suitable for the battery size.
- The battery of the normal machine must be the same capacity as that of the engine to be started.
- The starting system for this machine uses 24 V. For the normal machine, also use a 24 V battery.
- Check the cables and 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.

Booster Cable Connection

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 revolving frame of the problem machine.



Starting the Engine



WARNING

Before starting the engine, check that the safety lock lever is securely at the LOCK position.

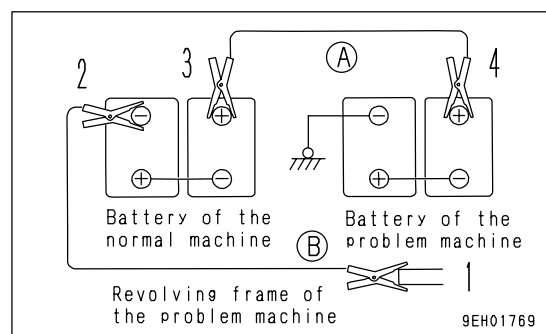
If the work equipment control lever is touched by mistake when starting the engine, the work equipment may move unexpectedly and cause serious damage or personal injury.

1. 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, try again after 2 minutes or so.

Booster Cable Disconnection

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 revolving frame 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 dose not glow brightly even when the engine runs at high speed	<ul style="list-style-type: none"> • Defective wiring • Defective adjustment of fan belt 	<ul style="list-style-type: none"> (• Check, repair loose terminals, disconnections) • Adjust fan belt tension For details, see EVERY 250 HOURS SERVICE
Lamp flickers while engine is running		
Charge level monitor dose not go out even when engine is running	<ul style="list-style-type: none"> • Defective alternator • Defective wiring 	<ul style="list-style-type: none"> (• Replace) (• Check, repair)
Abnormal noise is generated from alternator	<ul style="list-style-type: none"> • Defective alternator 	<ul style="list-style-type: none"> (• Replace)
Starting motor dose 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
Starting motor pinion repeatedly moves in and out (makes ratting sound)	<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 start	<ul style="list-style-type: none"> • Defective wiring • Insufficient battery charge 	<ul style="list-style-type: none"> (• Check, repair) • Charge
Pre-heating monitor dose not lights up	<ul style="list-style-type: none"> • Defective wiring • Defective monitor 	<ul style="list-style-type: none"> (• Check, repair) (• Replace)
Oil pressure monitor dose not lights up when engine is stopped (starting switch at ON position)	<ul style="list-style-type: none"> • Defective monitor • Defective oil pressure switch 	<ul style="list-style-type: none"> (• Replace) (• Replace)
While the deceleration monitor lamp is not lighted, the fuel adjusting dial does not work.	<ul style="list-style-type: none"> • Defective relay • Defective accelerator motor • Defective controller 	<ul style="list-style-type: none"> (• Replace) (• Replace) (• Replace)
The engine speed does not stop or rise, even if the deceleration switch is depressed.	<ul style="list-style-type: none"> • Defective wiring • Blown fuse 	<ul style="list-style-type: none"> (• Check, repair) (• Check, repair)

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
Speed of travel, swing, boom, arm and bucket is slow	<ul style="list-style-type: none"> • Lack of hydraulic oil 	<ul style="list-style-type: none"> • Adding oil to specified level, see CHECK BEFORE STARTING
Pump generates abnormal noise	<ul style="list-style-type: none"> • Clogged strainer in hydraulic tank 	<ul style="list-style-type: none"> • Clean, see EVERY 5000 HOURS SERVICE
Excessive rise in hydraulic oil temperature	<ul style="list-style-type: none"> • Loose fan belt • Lack of hydraulic oil 	<ul style="list-style-type: none"> • Adjust fan belt tension, see EVERY 250 HOURS SERVICE • Add oil to specified level, see CHECK BEFORE STARTING
Track comes off	<ul style="list-style-type: none"> • Track too loose 	<ul style="list-style-type: none"> • Adjusting track tension, see WHEN REQUIRED
Abnormal wear of sprocket		
Bucket rises slowly, dose not rise	<ul style="list-style-type: none"> • Lack of hydraulic oil 	<ul style="list-style-type: none"> • Adding oil to specified level, see CHECK BEFORE STARTING
The engine speed does not change, even if the fuel adjusting dial is turned	<ul style="list-style-type: none"> • The swift deceleration switch is turned ON. 	<ul style="list-style-type: none"> • Turn off the swift deceleration monitor lamp in the monitor panel by depressing the swift deceleration switch.

Engine

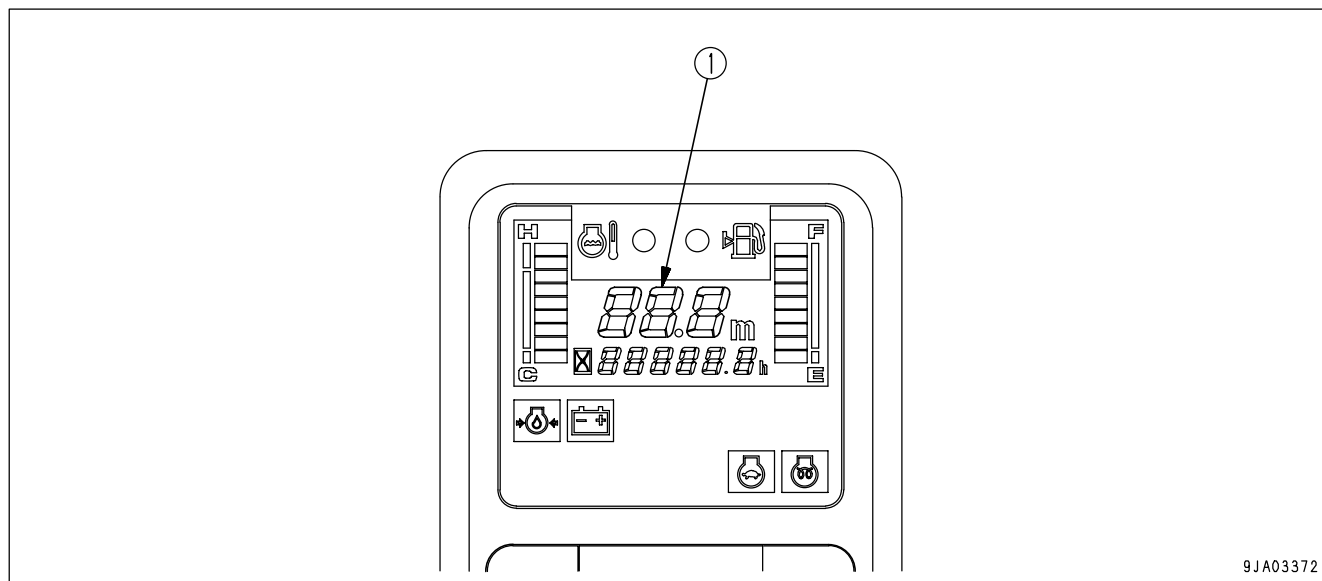
- (): Always contact your Komatsu distributor when dealing with these items.
- In cases of abnormalities or causes which are not listed below, please contact your Komatsu distributor for repairs.

Problem	Main causes	Remedy
Engine oil pressure monitor lights up	<ul style="list-style-type: none"> • Oil level low in oil pan (sucking air in) • Clogging oil filter cartridge • Defective tightening of oil pipe, pipe joint, oil leakage from damaged point • 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 spurts out from top of radiator (pressure valve)	<ul style="list-style-type: none"> • Cooling water level low, leakage of water • Loose fan belt • Dirt scale accumulated in cooling system 	<ul style="list-style-type: none"> • Check, add water, repair, see CHECK BEFORE STARTING • Adjust fan belt tension, see EVERY 250 HOURS SERVICE • Change coolant, flush inside of cooling system, see WHEN REQUIRED
Red range of engine water temperature gauge lights up	<ul style="list-style-type: none"> • Clogging radiator fins or damages fins • Defective thermostat • Loose radiator filler cap (high altitude operations) • Defective water level sensor 	<ul style="list-style-type: none"> • Clean or repair, see EVERY 500 HOURS SERVICE (• Replace thermostat) • Tightening cap or replace packing (• Replace sensor)
White range of engine water temperature gauge in light up even after operating for long time	<ul style="list-style-type: none"> • Defective thermostat 	<ul style="list-style-type: none"> (• Replace thermostat)
Engine dose not start when starting motor is turned	<ul style="list-style-type: none"> • Lack of fuel • Air in fuel system • Defective fuel injection pump or defective nozzle • Starting motor cranks engine sluggishly • Pre-heating monitor dose not light up • Defective compression <ul style="list-style-type: none"> • Defective valve clearance 	<ul style="list-style-type: none"> • Add fuel, see CHECK BEFORE STARTING • Repair place where air in sucked in, see EVERY 500 HOURS SERVICE (• Replace pump or nozzle) • See ELECTRICAL SYSTEM • See ELECTRICAL SYSTEM (• Adjust valve clearance)
Exhaust gas is white or blue	<ul style="list-style-type: none"> • Too mach oil in oil pan • Improper fuel • Rapid acceleration right after the engine start-up in cold temperature 	<ul style="list-style-type: none"> • Set oil in specified level, see CHECK BEFORE STARTING • Change to specified fuel • Avoid rapid acceleration until after the engine warming-up
Exhaust gas sometimes becomes black	<ul style="list-style-type: none"> • Clogging air cleaner element • Defective nozzle • Defective compression 	<ul style="list-style-type: none"> • Clean or replace, see WHEN REQUIRED (• Replace nozzle) (• See "Defective compression")
Combustion noise occasionally make breathing sound	<ul style="list-style-type: none"> • Defective nozzle 	<ul style="list-style-type: none"> (• Replace nozzle)

Problem	Main causes	Remedy
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 • See "Red range of engine water temperature gauge lights up" • Replace muffler (• Adjust valve clearance)
Engine stops while in work	<ul style="list-style-type: none"> • Clogging feed pump pre-filter • Defective engine and fuel line 	<ul style="list-style-type: none"> • Replace filter cartridge (• Check, repair)

Electronic Control System

If an error code appears on machine monitor display (1) (normally displays TIME), follow the countermeasure table for the self-diagnosis as shown below.



9JA03372

Machine Monitoring System

Monitor display	Error mode	Countermeasure
E02	Pump control system error	If emergency pump drive switch is set to the ON position, operation can be carried out. However, immediately have the system inspected by your Komatsu distributor. (*)
E03	Swing brake system error	Turn the swing brake cancel switch ON to release the brake. Depending on the cause of the failure, it may be possible to release the brake. In any case, have the system inspected immediately by your Komatsu distributor. (*)
E05	Governor system error	Fuel adjusting dial is inoperative. Either or both of acceleration or deceleration cannot be operated, depending on a failure mode. In any case, call for inspection service immediately.
Have the machine inspected immediately by your Komatsu distributor.		Have the machine inspected immediately by your Komatsu distributor.

(*): For details of handling the emergency pump drive switch, swing holding brake cancel switch, and emergency work equipment actuation switch, see "SWITCHES (PAGE 3-15)".

MAINTENANCE

 **WARNING**

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

MAINTENANCE INFORMATION

Do not carry out any inspection and maintenance operation that is not found in this manual.

Service Meter Reading

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 Lubricants

Use Komatsu genuine oils and grease. Choose oils and grease with proper viscosities specified for ambient temperature.

Windshield Washer Fluid

Use automobile window washer fluid, and be careful not to let any dirt get into it.

Fresh and Clean Lubricants

Use clean oil and grease. Also, keep the containers of the oil and grease clean. Keep foreign materials away from oil and grease.

Check Drained Oil and Used Filter

After oil is changed or filters are replaced, check the old oil and filters for metal particles and foreign materials. If large quantity of metal particles or foreign materials are found, always report to the person in charge, and carry out suitable action.

Fuel Strainer

Do not remove the strainer from the filler port when adding fuel.

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.
- If a seal or bearing happen to come between the welding part and grounding point, change the grounding point to avoid such parts.
- 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 Jobsite

When working at dusty worksites, do as follows:

- Inspect the dust indicator frequently to see if the air cleaner is dirty or clogged.
- 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 Lubricants

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. Never mix different kinds of oil.

Locking the Inspection Covers

If inspection or maintenance has to be carried out with the inspection cover open, lock it securely in position with the lock bar. If inspection or maintenance is carried out with the inspection cover not locked in position, there is a hazard that it may be suddenly blown shut by the wind and cause injury to the worker.

Hydraulic System - Air Bleeding

When hydraulic equipment has been repaired or replaced, or the hydraulic piping has been removed and installed again, the air must be bled from the circuit. For details, see "BLEEDING AIR FROM HYDRAULIC SYSTEM (PAGE 4-45)".

Hydraulic Hose Installation

- 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 Works

If you forget carrying 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 not forgotten?
 - Have all inspection and maintenance items been carried out correctly?
 - Have any tools or parts been not dropped inside the machine? It is particularly dangerous if parts are dropped inside the machine and get caught in the lever linkage mechanism.
 - Is there any leakage of water or oil? Have all the bolts been tightened?
- Checks when operating engine
 - For details of the checks when operating the engine, see "TWO WORKERS FOR MAINTENANCE WHEN ENGINE IS RUNNING (PAGE 2-34)" and pay careful attention to safety.
 - Are the inspection and maintenance items working properly?
 - Is there any leakage of fuel or oil when the engine speed is raised?

LUBRICANTS, COOLANT AND FILTERS

HANDLING OIL, FUEL, COOLANT, AND PERFORMING OIL CLINIC

Oil

- Oil is not dirty, always change the oil after the specified interval.
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.
- Never mix oils of different grades or brands.
- 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.
Take particular care not to let any impurities get in when adding oil.
The majority of problems with machine are caused by the entry of such impurities.
- Always add the specified amount of oil.
Having too much oil or too little oil are both causes of problems.
- When changing the oil, always replace the related filters at the same time.
- 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.
- 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.

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.
- If there is any foreign material in the fuel tank, wash the tank and fuel system.

Cooling System Coolant

- If the coolant level is low, it will cause overheating and will also cause problems with corrosion from the air in the coolant.
- River water contains large amount 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.
- This anti-freeze is also effective in preventing corrosion on the parts of the engine cooling system. It may be continuously used for two years or 4000 hours of operation, so continue to use it in the other seasons than summer, too.
- When using anti-freeze, always observe the precautions given in the Operation and Maintenance Manual.
Anti-freeze is flammable, so be extremely careful not to expose it to flame or fire.
The proper mixing proportion of the antifreeze depends on the ambient temperature. For the mixing proportion, see "CLEAN INSIDE OF COOLING SYSTEM (PAGE 4-21)".

Grease

- Grease is used to prevent twisting and noise at the joints.
- The nipples not included in the MAINTENANCE section are nipples used when overhauling, so they do not need grease.

If any part becomes stiff or generates noise after being used for a long time, grease it.

- 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)

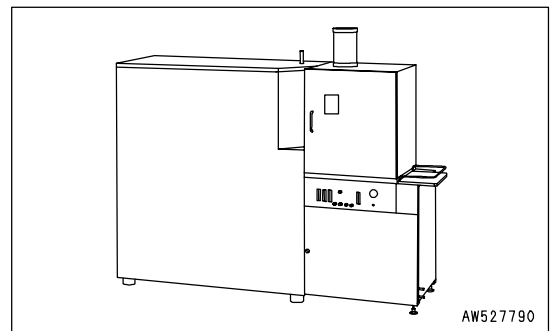
KOWA is a maintenance service that makes it possible to prevent machine failures and down-time. With KOWA, the oil is periodically sampled and analyzed. This enables early detection of wear of the machine drive parts and other abnormalities.

Periodic use of KOWA makes the following possible:

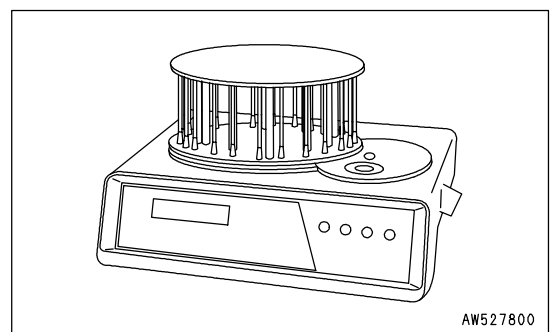
- It enables abnormalities to be detected early, leading to reduction of repair costs and machine downtime.
- It enables repair schedules to be planned, leading to improved machine availability.

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.

Oil And Fuel Storage

- 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.
- Do not open packs of spare filters until just before they are to be used.
- Always use Komatsu genuine filters.

ELECTRIC SYSTEM MAINTENANCE

- 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 those specified by Komatsu.
- External electro-magnetic 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.
- When installing electrical equipment, connect it to the special power source connector.
Do not connect the optional power source to the fuse, starting switch, or battery relay.

WEAR PARTS

Replace filter elements, bucket teeth, and other wear parts at the specified interval or before they reach the wear limit.

Replacing wear parts correctly ensures more economical use of the machine.

When replacing parts, always use high-quality Komatsu genuine parts.

When ordering parts, the parts differ according to the serial number of the machine, so please inform your Komatsu distributor of the machine serial number.

WEAR PARTS LIST

The parts in parentheses are to be replaced at the same time.

Item	Part No.	Part name	Q'ty	Replacement frequency
Engine oil filter	600-211-2110	Cartridge	1	EVERY 500 HOURS SERVICE
Fuel filter	600-311-7460	Cartridge	1	EVERY 500 HOURS SERVICE
Hydraulic oil filter	21W-60-41121 (07000-12135)	Element (O-ring)	1 (1)	EVERY 1000 HOURS SERVICE
Water separator	21W-04-41480	Element	1	-
Air cleaner	600-185-1300	Element assembly	1	-
Additional filter for breaker (if equipment)	201-973-7480	Element (incl. O-ring)	1	-
Bucket	20X-70-23160 (203-70-43212) (203-70-43220)	Vertical pin type Tooth (Pin) (Pin)	4 (4) (4)	-
	20X-70-14160 (20X-70-00100)	Horizontal pin type Tooth (Pin assembly)	4 (4)	-
	201-70-74171	Side cutter (left)	1	-
	201-70-74181 (21W-70-21810) (01803-02228)	Side cutter (right) (bolt) (Nut)	1 (6) (6)	

LUBRICANTS, FUEL AND COOLANT SPECIFICATIONS

PROPER SELECTION

RESERVOIR	KIND OF FLUID	AMBIENT TEMPERATURE					TEMPERATURE				
		-22	-4	14	32	50	68	86	104	122°F	
		-30	-20	-10	0	10	20	30	40	50°C	
Engine oil pan	Engine oil						SAE30				
							SAE10W				
							SAE10W-30				
					SAE15W-40						
Swing machinery case Final drive case PTO gear case	Engine oil						SAE30				
Hydraulic system							SAE30				
						SAE10W-30					
				SAE15W-40							
Fuel tank	Diesel fuel						ASTM D975 No. 2				
		*1									
Greasing system	Grease						NLGI No. 2				
Cooling system	Water	Add antifreeze									

*1: ASTM D975 No. 1

		Engine oil pan	Swing machinery case	Final drive case	PTO gear case	Hydraulic system	Fuel tank	Cooling system
Specified capacity	liter	7.5	2.0	1.3	0.4	110	125	10.5
	US gal	1.98	0.53	0.34	0.11	29.06	33.03	2.77
Refill capacity	liter	7.0	2.0	1.3	0.4	64	-	-
	US gal	1.85	0.53	0.34	0.11	16.91	-	-

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	Change 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 coolant
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 coolant
12	GULF	Super duty motor oil *Super duty plus	Multi-purpose gear lubricant	Gulfcrown EP2 Gulfcrown EP special	Antifeeze 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	PENNZOIL	*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	PETROFIN E	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 antifreeze and summer coolant
18	TEXACO	*Ursa super plus Ursa premium	Multigear	Multifak EP2 Starplex 2	Coda 2055 startex antifreeze coolant
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

TIGHTENING TORQUE SPECIFICATIONS

TIGHTENING TORQUE LIST

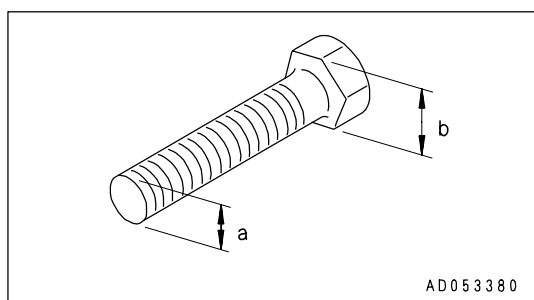


If nuts, bolts, or other parts are not tightened to the specified torque, it will cause looseness or damage to the tightened parts, and this will cause failure of the machine or problems with operation.

Always pay careful attention when tightening parts.

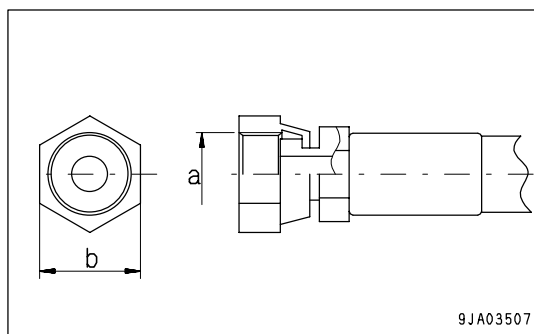
Unless otherwise specified, tighten the metric nuts and bolts to the torque shown in the table below. If it is necessary to replace any nut or bolt, always use a Komatsu genuine part of the same size as the part that was replaced.

Thread diameter of bolt (a)(mm)	Width across flats (b)(mm)	Tightening torque					
		Target value			Service limit		
		N·m	kgf·m	lbft	N·m	kgf·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	172	17.5	126.6	153-190	15.5-19.5	112.1-141
16	24	260	26.5	191.7	235-285	23.5-29.5	170.0-213.4
18	27	360	37	267.6	320-400	33.0-41.0	238.7-296.6
20	30	510	52.3	378.3	455-565	46.5-58.0	336.3-419.5
22	32	688	70.3	508.5	610-765	62.5-78.0	452.1-564.2
24	36	883	90	651	785-980	80.0-100.0	578.6-723.3
27	41	1295	132.5	958.4	1150-1440	118.0-147.0	853.5-1063.3
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	200.0-250.0	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					
		Target value			Permissible range		
		N·m	kgf·m	lbft	N·m	kgf·m	lbft
9/16 -18UNF	19	44	4.5	32.5	35 - 63	3.5 - 6.5	25.3 - 47.0
11/16 -16UN	22	74	7.5	54.2	54 - 93	5.5 - 9.5	39.8 - 68.7
13/16 -16UN	27	103	10.5	75.9	84 - 132	8.5 - 13.5	61.5 - 97.6
1 -14UNS	32	157	16.0	115.7	128 - 186	13.0 - 19.0	94.0 - 137.4
13/16 -12UN	36	216	22.0	159.1	177 - 245	18.0 - 25.0	130.2 - 180.8



SAFETY CRITICAL PARTS

For using the machine safely for an extended period of time, you are requested to periodically replace the safety-critical and fire prevention-related parts listed in the table of important parts on the following page.

Material quality of these parts can change as time passes and they are likely to wear out or deteriorate. However, it is difficult to determine the extent of wear or deterioration at the time of periodic maintenance. Hence it is required to replace them with new ones irrespective of their conditions after a certain period of usage. This is important to ensure that these parts maintain their full performance at all the time.

Furthermore, should anything abnormal be found on any of these parts, replace it with a new one even if the periodic replacement time for the parts has not yet arrived.

If any of the hose clamps show deterioration like deformation or crack, replace such a defective clamp with a new one together with a defective hose.

Also carry out the following checks with hydraulic hoses which need not be replaced periodically. Tighten a loosened clamp again or replace a defective hose, as such abnormality requires.

When replacing the hoses, always replace the O-rings, gaskets, and other such parts at the same time.

Ask your Komatsu distributor to replace the critical parts.

SAFETY CRITICAL PARTS LIST

No.	Safety critical parts for periodic replacement	Q'ty	Replacement interval
1	Fuel hose (fuel tank - water separator)	1	Every 2 years or 4000 hours, whenever comes sooner
2	Fuel hose (water separator - feed pump pre-filter)	1	
3	Fuel hose (feed pump pre-filter - fuel filter)	1	
4	Fuel hose (fuel filter - injection pump)	1	
5	Fuel hose (fuel tank - stop valve)	1	
6	Fuel hose (fuel tank - air bleed tube)	1	
7	Fuel return hose (injection pump - fuel filler port hose)	2	
8	Spill hose (nozzle - fuel filler port hose)	1	
9	Fuel hose (fuel tank - fuel filler port)	2	
10	Fuel hose (fuel filler port - fuel filler post hose)	1	
11	Hydraulic hose (main pump delivery)	3	
12	Hydraulic hose (main pump suction)	3	
13	Hydraulic hose (boom cylinder - control valve)	4	
14	Hydraulic hose (arm cylinder - control valve)	4	
15	Hydraulic hose (bucket cylinder - control valve)	4	
16	Hydraulic hose (swing motor - control valve)	2	
17	Hydraulic hose (blade cylinder - control valve)	4	
18	Seat belt	1	Every 3 years

MAINTENANCE SCHEDULE

If the machine is equipped with a hydraulic breaker, the maintenance schedule for some parts will be different. For details, see "MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (PAGE 4-15)" to confirm the correct maintenance schedule when carrying out maintenance.

MAINTENANCE SCHEDULE CHART

INITIAL 250 HOURS MAINTENANCE (ONLY AFTER THE FIRST 250 HOURS)

Replace Fuel Filter Cartridge	4- 59
Change Oil In Engine Oil Pan, Replace Engine Oil Filter Cartridge	4- 60

WHEN REQUIRED

Check, clean and replace air cleaner element	4- 17
Clean inside of cooling system	4- 21
Replace water separator element	4- 23
Clean fuel tank	4- 24
Check and tighten track shoe bolts	4- 25
Check and adjust track tension	4- 26
Check road liners or rubber shoes	4- 28
Check and adjust rubber shoe tension	4- 30
Replace road liners	4- 31
Replace rubber shoes	4- 32
Change steel shoes or road liner to rubber shoes	4- 34
Replace bucket teeth (vertical pin type)	4- 35
Replace bucket teeth (horizontal pin type)	4- 38
Adjust bucket clearance	4- 39
Check window washer fluid level, add fluid	4- 40
Check and adjust air conditioner	4- 41
Check, clean and lubricate cab slide door rail and roller	4- 42
Replace breaker circuit additional oil filter element	4- 43
Wash washable floor	4- 44
Bleeding air from hydraulic system	4- 45

CHECKS BEFORE STARTING

EVERY 50 HOURS MAINTENANCE

Drain Water From Fuel Tank	4- 49
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EVERY 100 HOURS MAINTENANCE

Lubricating	4- 50
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EVERY 250 HOURS MAINTENANCE

Lubricating	4- 51
Check Oil Level In Final Drive Case, Add Oil	4- 53
Check Level Of Battery Electrolyte	4- 54
Check And Adjust Cooling Fan Belt Tension	4- 56
Check Air Conditioner Compressor Belt Tension, Adjust	4- 58

EVERY 500 HOURS MAINTENANCE

Replace Fuel Filter Cartridge	4- 59
Change Oil In Engine Oil Pan, Replace Engine Oil Filter Cartridge	4- 60
Clean Internal And External Air Filters Of Air Conditioner	4- 61
Clean, Check Radiator Fins, Oil Cooler Fins And Condenser Fins	4- 63
Lubricate Swing Circle	4- 65
Check Swing Pinion Grease Level, Add Grease	4- 65

EVERY 1000 HOURS MAINTENANCE

Replace Hydraulic Oil Filter Element	4- 66
Change Oil In Swing Machinery Case	4- 68
Change Oil In Final Drive Case	4- 69

EVERY 2000 HOURS MAINTENANCE

Check PTO Gear Case, Add Oil	4- 70
Clean, Check Turbocharger	4- 70
Check Alternator, Starting Motor	4- 70
Check Engine Valve Clearance, Adjust	4- 70

EVERY 4000 HOURS MAINTENANCE

Check Water Pump	4- 71
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EVERY 5000 HOURS MAINTENANCE

Change Oil In Hydraulic Tank, Clean Strainer	4- 72
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MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER

For machine equipped with a hydraulic breaker, the hydraulic oil deteriorates faster than for normal bucket digging operations, so set the maintenance intervals as follows.

• **Replace hydraulic filter element**

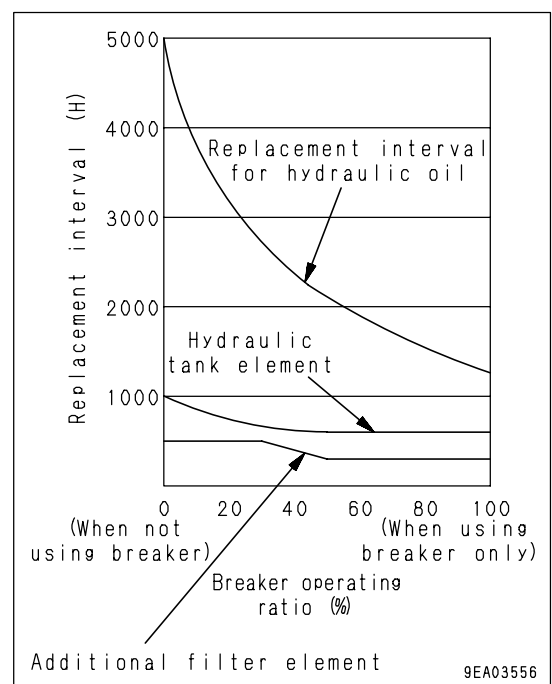
On a new machine, replace the element after the first 100 to 150 hours, then carry out further replacement of the element according to the table on the right.

• **Change oil in hydraulic tank**

Change the oil according to the table on the right.

• **Replacing additional filter element for breaker (if equipped)**

Use a guideline of 250 hours for use of the breaker (operating ratio for the breaker: 50 % or more), and replace the element according to the table on the right.



MAINTENANCE PROCEDURE

INITIAL 250 HOURS MAINTENANCE (ONLY AFTER THE FIRST 250 HOURS)

Carry out the following maintenance only after the first 250 hours.

- Replace Fuel Filter Cartridge
- Change Oil In Engine Oil Pan, Replace Engine Oil Filter Cartridge

For details of the method of maintaining, see EVERY 500 HOURS MAINTENANCE.

WHEN REQUIRED

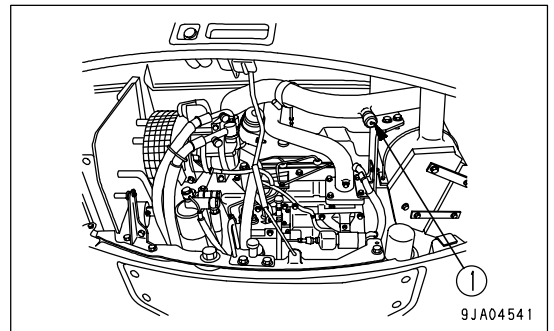
CHECK, CLEAN AND REPLACE AIR CLEANER ELEMENT

! 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

Whenever the red piston in dust indicator (1) appears, clean the air cleaner element.

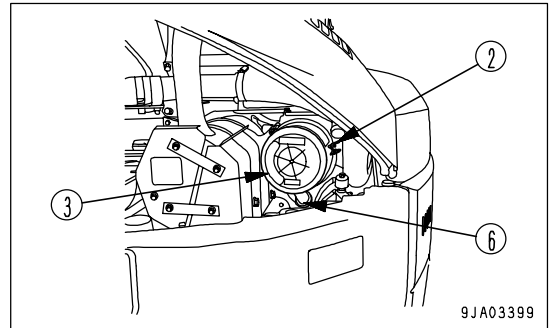


NOTICE

Do not clean the air cleaner element before the dust indicator becomes red. If the element is cleaned frequently before the dust indicator becomes red, the performance of the air cleaner is not used perfectly and the cleaning effect is lowered. In addition, dust sticking to the element falls into the inner element each time the element is cleaned.

Cleaning or replacing outer element

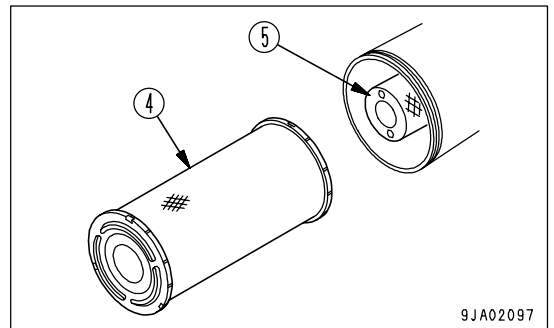
1. Open up the engine hood cover, then release clips (2) at three points and detach cover (3).



NOTICE

Never remove inner element (5). If it is removed, dust will enter and cause an engine trouble.

2. Remove outer element (4).



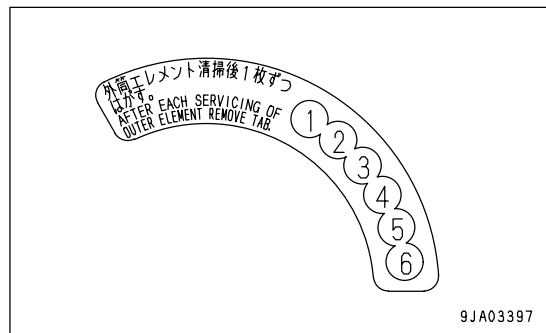
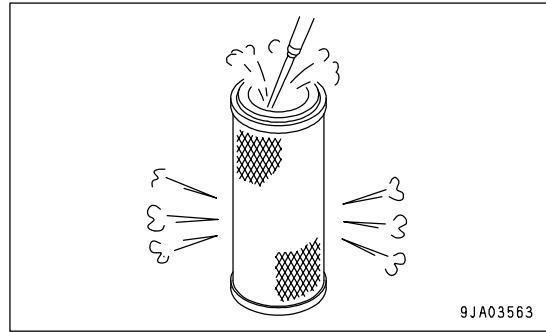
3. Clean the interior of the air cleaner body, cover (3) and vacuater valve (6).

NOTICE

The inner element must not be used again even after its cleaning. When replacing the outer element, replace the outer element at the same time.

4. Direct dry compressed air (Max. 0.69 MPa (7 kgf/cm², 99.4 PSI)) from the inside of the outer element along its folds. Then blow from the outside, and finally blow again from the inside.

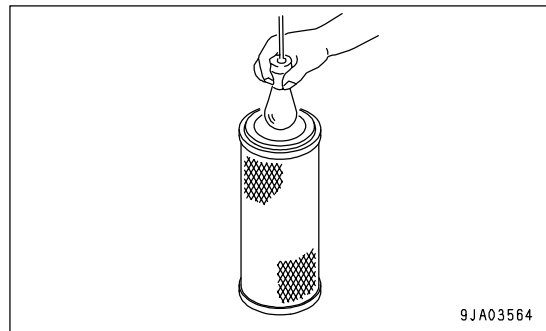
- 1) Replace any outer element, which has been cleaned 6 times or used for one year. Replace the inner element at the same time.
- 2) Replace both inner and outer elements when the dust indicator red piston appears soon after installing the cleaned outer element even though it has not been cleaned 6 times.
- 3) Remove one seal from the element whenever the element has been cleaned.



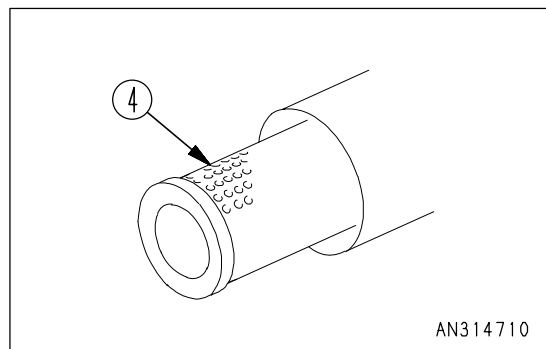
5. If small holes or thinner parts are found on the element when it is checked by shining a light through it after cleaning, replace the element.

NOTICE

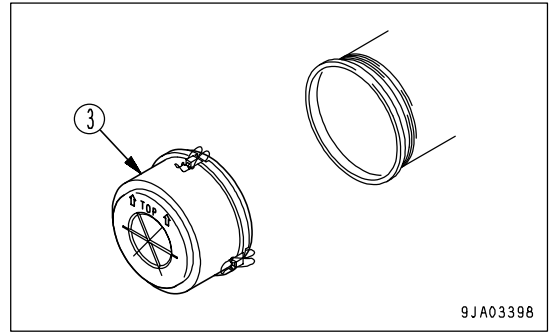
When cleaning the element, do not hit or beat it against anything. Do not use an element whose folds, gasket or seal are damaged.



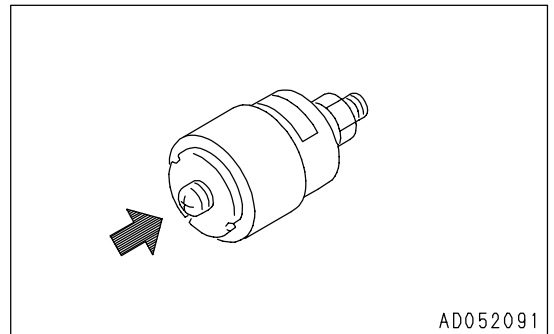
6. Set the cleaned outer element (4) in position.



7. Set the arrow mark on cover (3) at the top, install to the air cleaner body, then secure with clip (2).

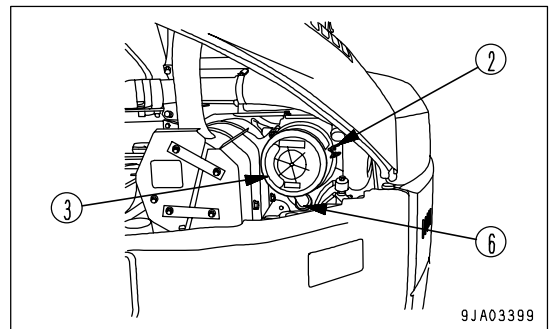


8. Press the button of dust indicator (1) to return the red piston to its original position.

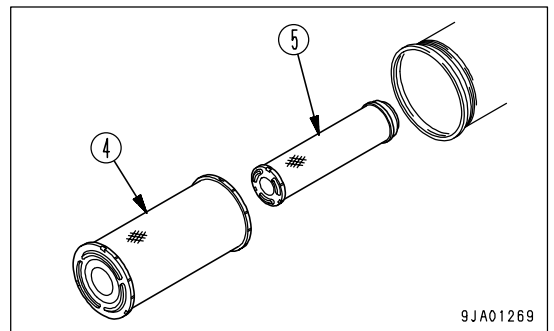


Replacing element

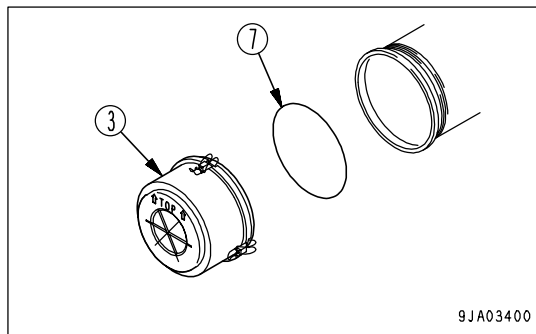
1. Open up the engine hood cover, then release clips (2) at three points and detach cover (3).



2. Remove outer element (4).
Do not remove inner element (5) at this time, however.
3. Clean the interior of the air cleaner body, cover (3) and vacuater valve (6).
4. Remove inner element (5), then install a new inner element immediately.
5. Set the new outer element (4) in position.

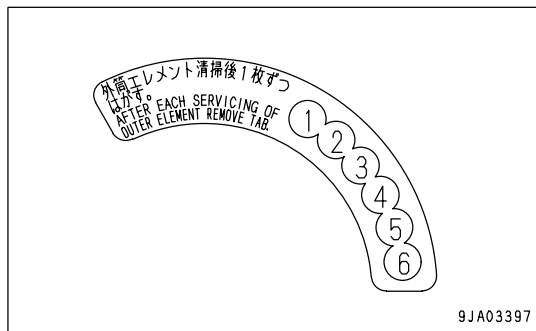


- 6. Replace O-ring (7) for cover (3) with new one.
- 7. Set the arrow mark on cover (3) at the top, install to the air cleaner body, then secure with clip (2).



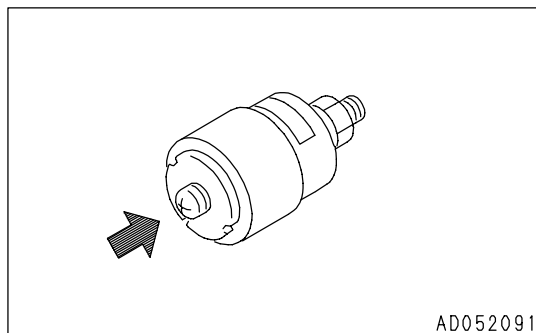
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- 8. Replace the seal attached to cover (3) with new one.



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- 9. Return the red piston in the dust indicator (1) to its original position.



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CLEAN INSIDE OF COOLING SYSTEM



WARNING

- **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 drain the coolant 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.**
- **Cleaning is carried out with the engine running. When standing up or leaving the operator's seat, set the safety lock lever to the LOCK position.**
- **For details of starting the engine, see "BEFORE STARTING ENGINE (PAGE 3-56)" and "STARTING ENGINE (PAGE 3-72)" in the OPERATION section.**
- **The engine is operated when washing, so it is dangerous if the machine moves when you are standing behind it. Never stand behind the machine when the engine is running.**

Clean the inside of the cooling system, change the coolant and replace the corrosion resistor agent KI according to the table below.

Kind of coolant	Cleaning inside of cooling system and changing coolant	Adding corrosion resistor agent KI
Permanent type antifreeze (All season type)	Every year (autum) or every 2000 hours whichever comes first	Every 1000 hours and when cleaning the inside of the cooling system and when changing coolant.
Non-permanent type antifreeze containing ethylene glycol (winter, one season type)	Every 6 months (spring and autum) (Drain antifreeze in spring, add antifreeze in autum)	
When not using antifreeze	Every 6 months or every 1000 hours whichever comes first	

Stop the machine on level ground when cleaning or changing the coolant.

Use a permanent type of antifreeze.

If, for some reason, it is impossible to use permanent type antifreeze, use an antifreeze containing ethylene glycol. 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.

In areas where the water is hard, always add Komatsu genuine corrosion resistor agent KI. One packet of corrosion resistor agent contains 100g (0.22 lb). The standard density of the mixture should be 7g/liter (0.065 oz/US gal).

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	Above -10	-15	-20	-25	-30
	°F	Above 14	5	-4	-13	-22
Amount of antifreeze	Liter	3.2	3.8	4.3	4.8	5.3
	US gal	0.85	1.00	1.14	1.27	1.40
Amount of water	Liter	7.3	6.7	6.2	5.7	5.2
	US gal	1.93	1.77	1.64	1.51	1.37

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 amount of fresh water and see a doctor at once.

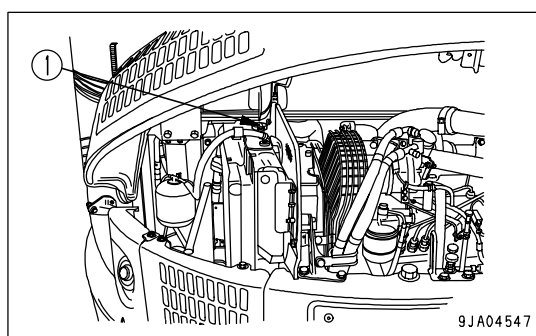
Use city water for the cooling water.

If river water, well water or other such water supply must be used, contact your Komatsu distributor.

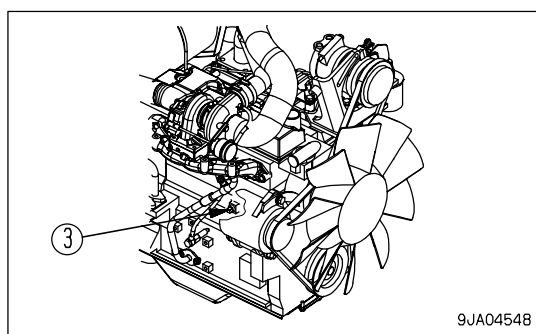
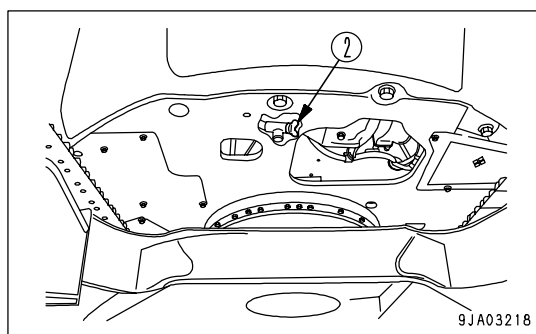
We recommend use of an antifreeze density gauge to control the mixing proportions.

- Prepare a container to catch the drained coolant (Min 11 liters (2.91 US gal) capacity).
- Prepare a water inlet hose.

1. Stop the engine.
2. Open engine hood.
3. Check that the cooling water temperature has gone down enough to make it possible to touch the radiator cap surface by hand, then turn radiator cap (1) slowly until it contacts the stopper to release the pressure.
4. Following this, push radiator cap (1), turn it until it contacts the stopper, then remove it.



5. Set the container under drain valve (2) and drain plug (3) to catch the coolant mixture.
6. After draining the antifreeze solution, close drain valve (2) and tighten drain plug (3), then fill with clean water. After the radiator is filled with water, start and run the engine at low idling speed. After the water temperature rises above 90°C (194° F), run the engine for about 10 minutes.
7. Stop the engine and open drain valve (2) and remove drain plug (3) to drain the water.
8. After draining the water, clean the radiator with detergent. For the cleaning method, follow the instruction of detergent.
9. Close drain valve (2). Wind seal tapes onto drain plug (3), then tighten it.

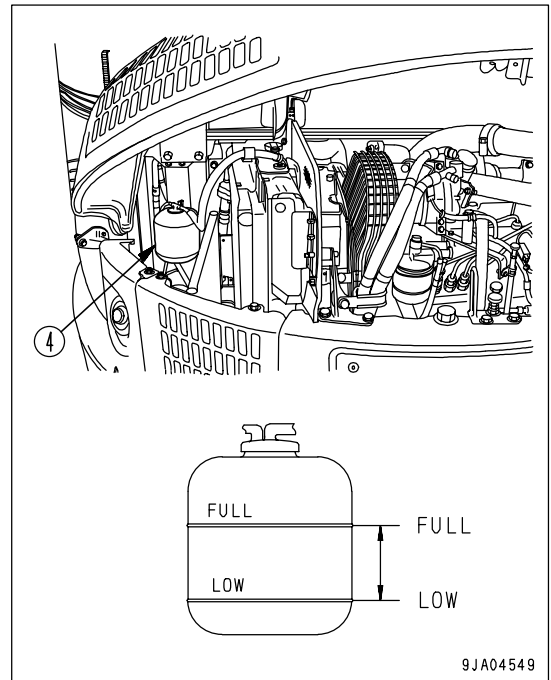


10. Decide the proportions of antifreeze and water according to the table for the mixing rate of water and antifreeze.
11. After the engine warming up, check that each gauge and caution lamp are in normal condition. If any abnormality is found, carry out adjustment or repairs.

Operate the machine under a light load until the engine water temperature gauge (2) points to the white range (monitor panel spec.) or the green range (gauge panel spec.).

To remove the air in the cooling water, run the engine for 5 minutes at low idling, then for another 5 minutes at high idling. (While doing this, leave the radiator cap removed)

12. Drain the cooling water inside sub-tank (4), clean the inside of the sub-tank, then fill again with cooling water to a point midway between the FULL and LOW marks.
13. Stop the engine. About 3 minutes later, supply city water up to the water filler, then close radiator cap.



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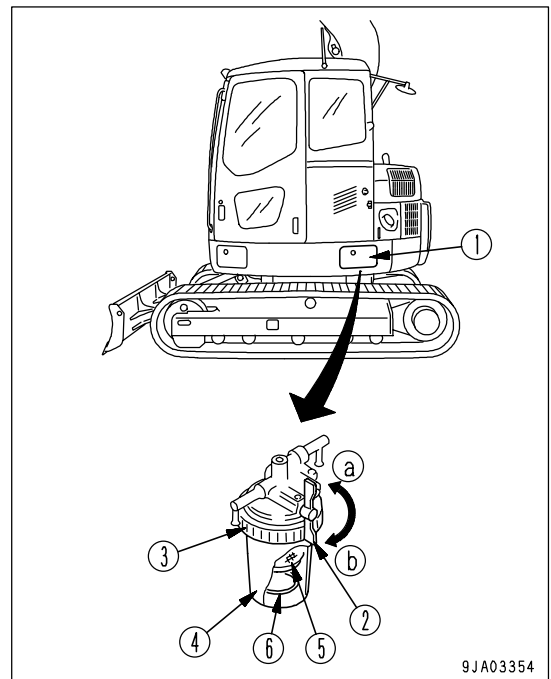
REPLACE WATER SEPARATOR ELEMENT



WARNING

Do not bring any fire or flame close.

- Prepare the filter wrench for water separator.
1. Open inspection cover (1) on the left side of the machine and set handle (2) of the filter inside to the CLOSED position (a).
 2. Using a filter wrench, loosen ring (3), then remove element cup (4) and take out element (5).
Be careful not to lose red ring (6) inside the case.
 3. Wash element cup (4) in diesel fuel or flushing oil.
 4. Install new element (5).
 5. Insert a red ring (6) into element cover (4), fill with fuel, install to the filter holder, then tighten ring (3).
 6. Set handle (2) to the OPEN position (b).
 7. After replacing the element, bleed the air.
For details of the method for bleeding the air, see "Air Bleeding (PAGE 4-59)".



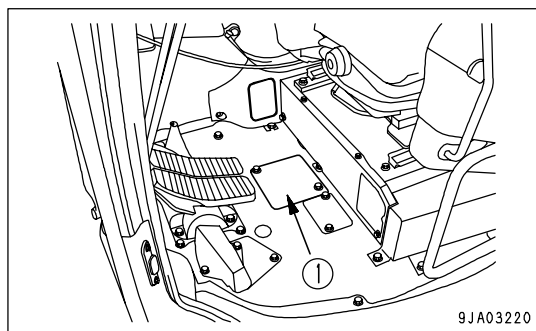
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CLEAN FUEL TANK

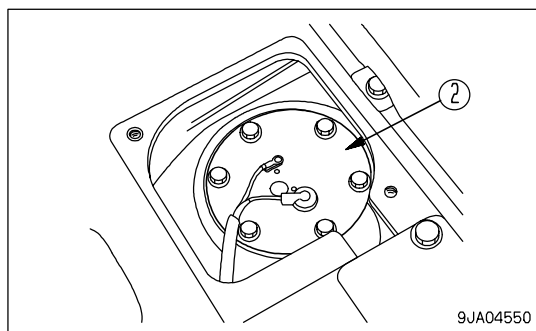
NOTICE

- Never use trichlene for washing the inside of the tank. Use diesel fuel only.
- Carry out this procedure before operating the machine as a daily maintenance.

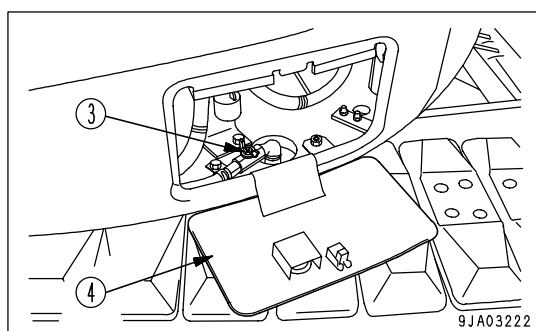
1. Drain fuel in the fuel tank, referring to the steps 1. through 3. of the section of "DRAIN WATER FROM FUEL TANK (PAGE 4-49)" in this manual.
2. Remove floor mat.
3. Remove cover (1).



4. Remove fuel sensor (2).



5. Wash inside of the tank.
6. After washing the tank, tighten drain valve (3) and install fuel sensor (2), cover (1) and floor mat.
7. Close inspection cover (4).



CHECK AND TIGHTEN TRACK SHOE BOLTS

(Machine equipped with steel shoes, road liners)

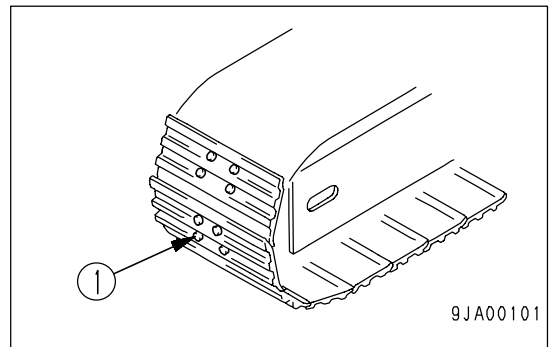
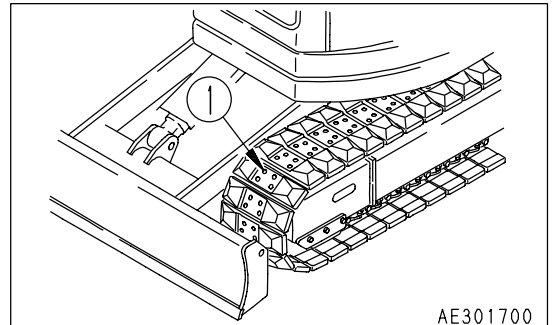
If the machine is used with track shoe bolts (1) loose, they will break, so tighten any loose bolts immediately

Method for further tightening of road liner

Tighten to a tightening torque of $196 \pm 19.6 \text{ N}\cdot\text{m}$ ($20 \pm 2 \text{ kgf}\cdot\text{m}$, $144.7 \pm 14.5 \text{ lbft}$) then check that the nut and shoe are in close contact with the link contact surface.

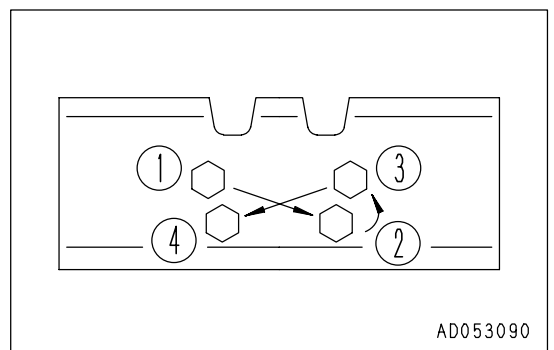
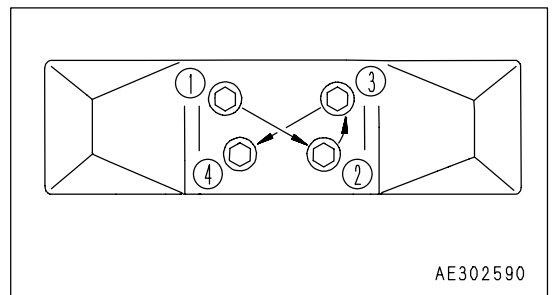
Method for further tightening of steel shoe

1. First tighten to a tightening torque of $118 \pm 19.6 \text{ N}\cdot\text{m}$ ($12 \pm 2 \text{ kgf}\cdot\text{m}$, $86.8 \pm 14.5 \text{ lbft}$) then check that the nut and shoe are in close contact with the link contact surface.
2. After checking, tighten a further $90^\circ \pm 10^\circ$.



Order for tightening

Tighten the bolts in the order shown in the diagram on the right. After tightening, check that the nut and shoe are in close contact with the link mating surface.



CHECK AND ADJUST TRACK TENSION

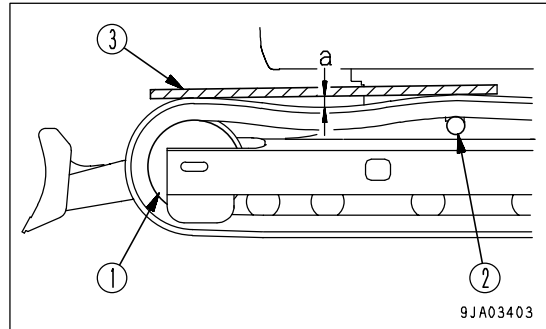
(Machine equipped with steel shoes, road liners)

The wear of the pins and bushings on the undercarriage will vary with the working conditions and type of soil, so inspect the track tension frequently in order to maintain the standard tension.

Stop the machine on firm, horizontal ground when carrying out the inspection and maintenance.

Checking

1. Run the engine at low idling, move the machine forward a distance equal to the length of track on ground, then stop the machine.
2. Choose wooden block (3) that will reach from idler (1) to carrier roller (2), then place it on top of the track.
3. Measure the maximum deflection between the top surface of the track and the bottom surface of the wooden block.
 - Standard deflection
Deflection "a" should be 10 to 30 mm (0.4 to 1.2 in).

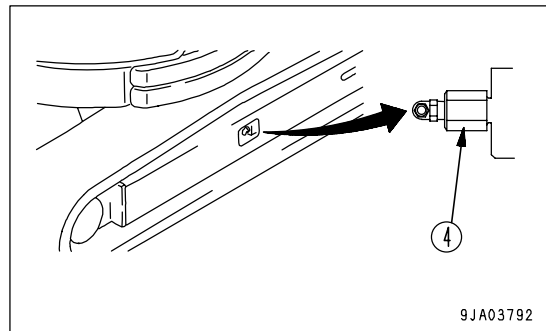


If the track tension is not at the standard value, adjust it in the following manner.

Adjustment



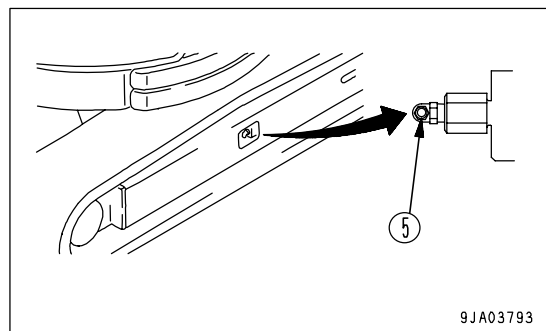
There is danger of plug (4) flying out under the high internal pressure of the grease. Never loosen plug (4) more than 1 turn. Never loosen any part other than plug (4). Never put your face in the mounting direction of plug (4). If the track tension cannot be loosened with the procedure given here, please contact your Komatsu distributor.



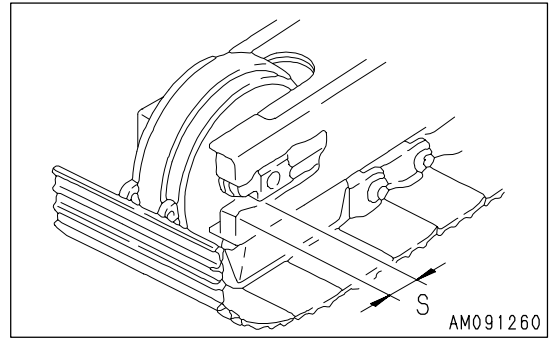
Increasing Track Tension

Prepare a grease gun.

1. Pump in grease through grease fitting (5) with a grease pump.
2. To check that the track tension is correct, run the engine at low idling, move the machine forward a distance equal to the length of track on ground, then stop the machine.
3. Check the track tension again, and if the tension is not correct, adjust it again.



4. Continue to pump in grease until dimension S becomes zero (0). If the tension is still loose, the pin and bushing are excessively worn, so they must be either turned or replaced. Please contact your Komatsu distributor for repairs.

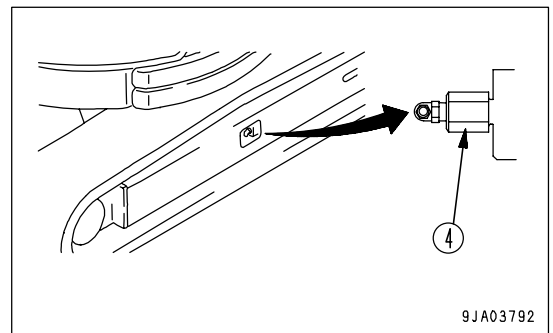


Loosening Track Tension



**It is extremely dangerous to release the grease by any method except the procedure given below.
If the track tension is not relieved by this procedure, please contact your Komatsu distributor for repairs.**

1. Loosen plug (4) gradually to release the grease.
2. When loosening plug (4), turn it a maximum of one turn.
3. If the grease does not come out smoothly, move the machine forwards and backwards a short distance.
4. Tighten plug (4).
5. To check that the track tension is correct, run the engine at low idling, move the machine forward a distance equal to the length of track on ground, then stop the machine.
6. Check the track tension again, and if the tension is not correct, adjust it again.



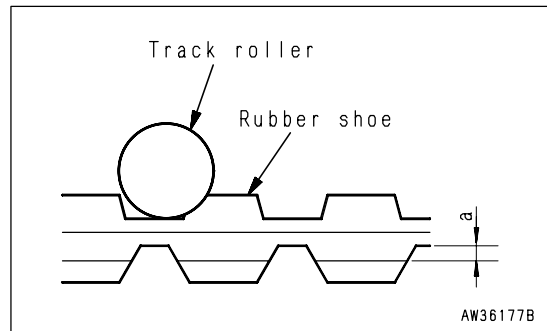
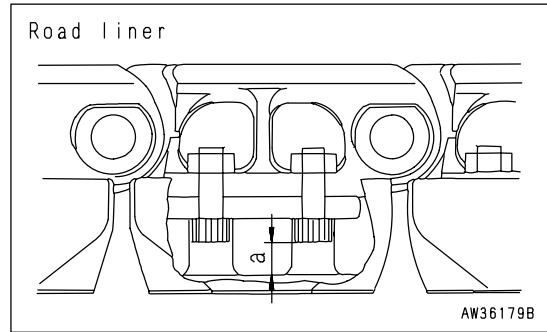
CHECK ROAD LINERS OR RUBBER SHOES

(Machine equipped with road liner or rubber shoe)

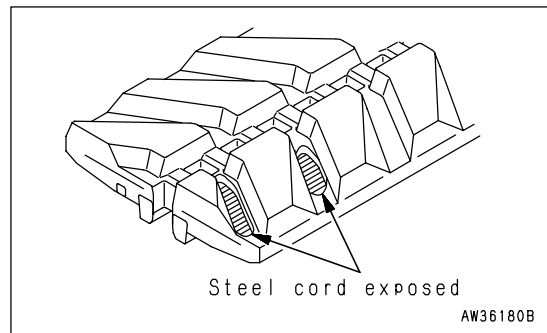
If the road liners and rubber shoes are in the following condition, they must be repaired or replaced, so please contact your Komatsu distributor for repairs or replacement.

Lug Height

- If lug height "a" is reduced by wear, the drawbar pull will drop.
If "a" is less than 5mm (0.2 in), replace with a new part.

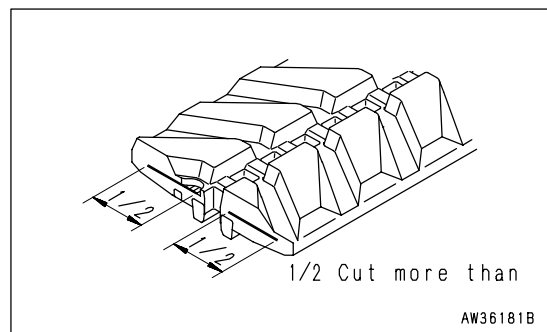


- If the lug wears and the steel cord inside the shoe is exposed for two links or more, replace with a new part.
(Machine equipped with rubber shoes)



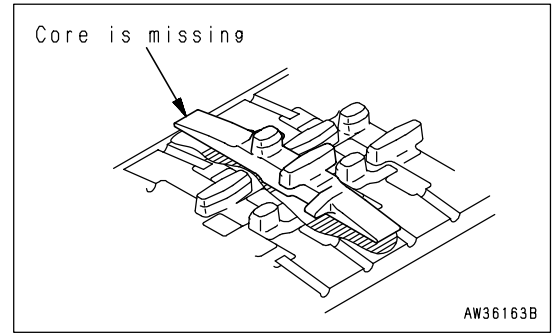
Rubber Shoe Steel Code Cuts

If more than half of the steel cord layer on one side is cut, replace with a new part.



Rubber Shoe Core Separations

If the rubber core has separated at one place or more, replace with a new part.



Rubber Shoe Tension

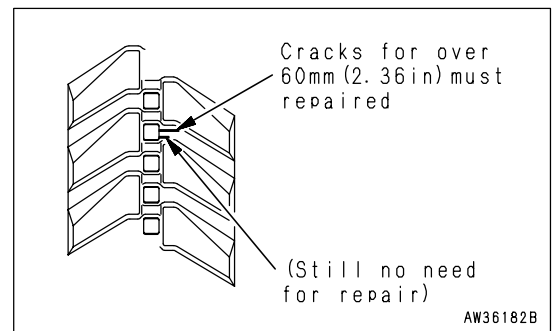
If the rubber shoe is still slack even when grease is pumped in, replace with a new part or replace the seal inside the cylinder.

If the track tension can only be increased to a level where the rubber shoe may come off, there may be not only elongation of the rubber shoe but also damage to the grease cylinder.

Rubber Shoe Cracks

If the cracks between the rubber shoe lugs increase to a size of approx. 60mm (2.36 in) the rubber shoe must be repaired. Even if the crack is small and short, if the steel cord can be seen inside, carry out repairs immediately.

If the length is less than 30mm (1.18 in) or the depth of the crack is less than 10mm (0.39 in), there is no particular need to carry out repairs.



When making judgement whether to replace, repair, or continue using road liner and rubber shoe, please contact your Komatsu distributor.

CHECK AND ADJUST RUBBER SHOE TENSION

(Machine equipped with rubber shoes)

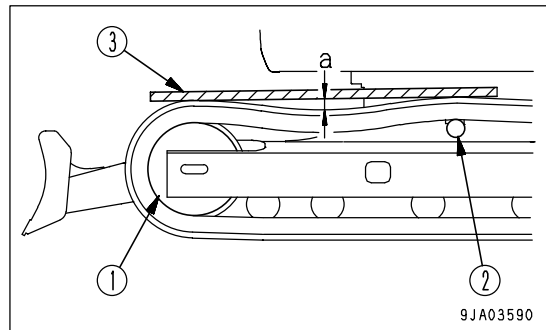
The wear of the rubber shoe will vary with the work conditions and type of soil, so inspect the wear and track tension whenever necessary. Stop the machine on firm, horizontal ground when carrying out the inspection and maintenance.

In particular, on new machines or after new tracks have been installed and the tension has been set to the specified value, the track tension will become loose in the first 5 to 30 hours when the machine has been used for a certain amount of repeated travel. If the track tension is adjusted frequently until the initial loosening no longer occurs, this will prevent the shoes from coming off due to insufficient track tension.

If operations are carried out when the rubber shoe is loose, the track will come off and it will cause premature wear of the core.

Checking

1. Run the engine at low idling, move the machine forward a distance equal to the length of track on ground, then stop the machine.
2. Choose wooden block (3) that will reach from idler (1) to carrier roller (2), then place it on top of the track.
3. Measure the maximum deflection between the top surface of the rubber shoe and the bottom surface of the wooden block.
 - Standard deflection
Deflection "a" should be 1 to 3 mm (0.039 to 0.118 in).



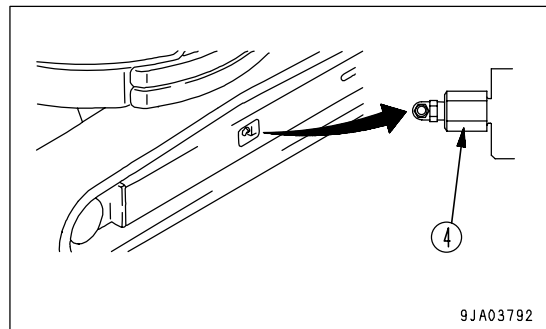
If the track tension is not at the standard value, adjust it in the following manner.

Adjustment

! WARNING

There is danger of the plug (4) flying out under the high internal pressure of the grease. When loosening plug (4), never loosen it more than one turn. Never loosen any part other than plug (4). Never put your face in line with the mount of plug (4).

If the Rubber shoe tension is not relieved by this procedure, please contact your Komatsu distributor.



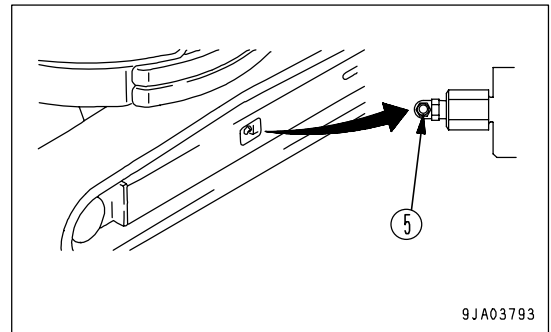
Increasing Track Tension

NOTICE

The standard value is low, so be careful not to tighten the rubber shoe too much.

Prepare a grease gun.

1. Pump in grease through grease fitting (5) with a grease pump.
2. To check that the track tension is correct, run the engine at low idling, move the machine forward a distance equal to the length of track on ground, then stop the machine.
3. Check the rubber shoe tension again, and if the tension is not correct, adjust it again.
4. If the tension is still low after supplied grease, the rubber shoe needs to be replaced or the seal in the cylinder needs to be replaced. Ask your Komatsu distributor for replacement.



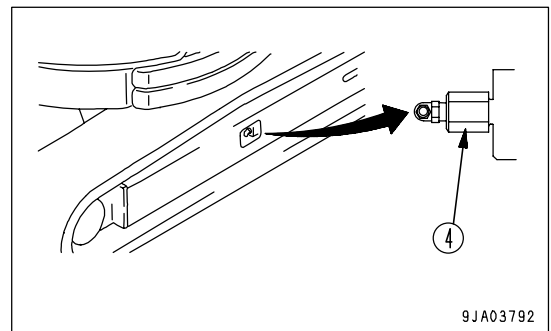
Loosening Track Tension



WARNING

It is extremely dangerous to release the grease by any method except the procedure given below. If the track tension is not relieved by this procedure, please contact your Komatsu distributor.

1. Loosen plug (4) gradually to release the grease.
2. When loosening plug (4), turn it a maximum of one turn.
3. If the grease does not come out smoothly, move the machine forwards and backwards a short distance.
4. Tighten plug (4).
5. To check that the track tension is correct, run the engine at low idling, move the machine forward a distance equal to the length of track on ground, then stop the machine.
6. Check the rubber shoe tension again, and if the tension is not correct, adjust it again.



REPLACE ROAD LINERS

(Machine equipped with road liner)

- When replacing all the road liner for the machine, please contact your Komatsu distributor to have the replacement carried out.
- When replacing only part of the road liner, use the special road liner removal tool. Please order the tool from your Komatsu distributor.

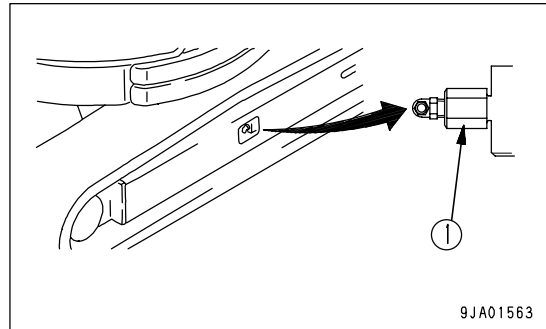
REPLACE RUBBER SHOES

(Machine equipped with rubber shoes)



WARNING

- Carry out this operation with two workers. The operator must move the machine in accordance with the signals from the other worker.
- The rubber shoes are replaced with the machine raised, so it is extremely dangerous if the machine is lowered by mistake during the replacement operation. During the replacement operation, never move the rubber shoe track except the rubber shoe track to be replaced. In addition, never go under or put any part of your body under the rubber shoe or track frame during the replacement operation.
- To check that the track tension is correct, run the engine at low idling, move the machine forward a distance equal to the length of track on ground, then stop the machine.



NOTICE

It is possible to change from the rubber shoe to the road liner and steel shoe. However, it is necessary to remove the idler guard and to carry out adjustment, so always contact your Komatsu distributor to have the replacement carried out.

- Prepare a grease gun.
- Prepare a steel pipe

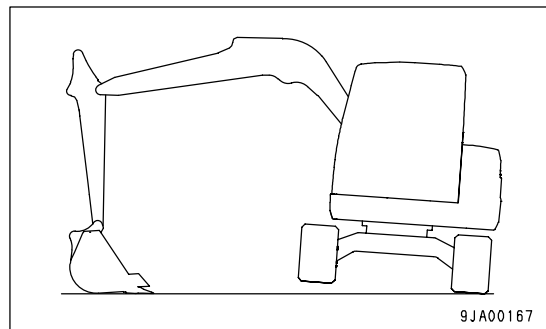
Rubber Shoes Removal



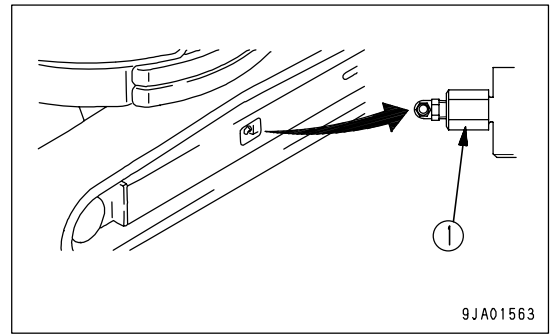
WARNING

- It is extremely dangerous to release the grease by any method except the procedure given below. If the rubber shoe tension is not relieved by this procedure, please contact your Komatsu distributor for repairs.
- Check that all the grease has been released before rotating the sprocket to remove the rubber shoe.

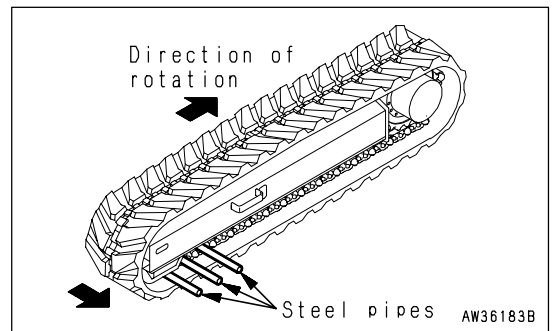
1. Raise the chassis with the boom and arm.
When doing this, operate the levers slowly.



2. Loosen plug (1) gradually to release the grease.
3. When loosening plug (1), turn it a maximum of one turn.

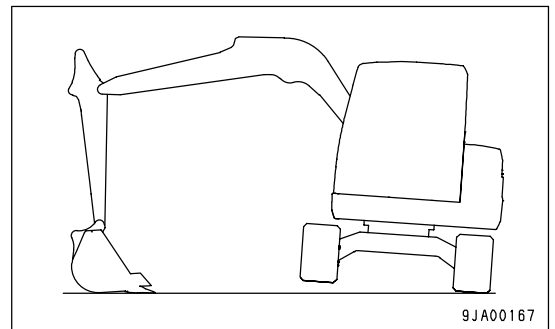


4. Fit the steel pipes inside the rubber shoe, rotate the sprocket in reverse, so that the steel pipes make the rubber shoe come up from the idler, then to the side to remove.

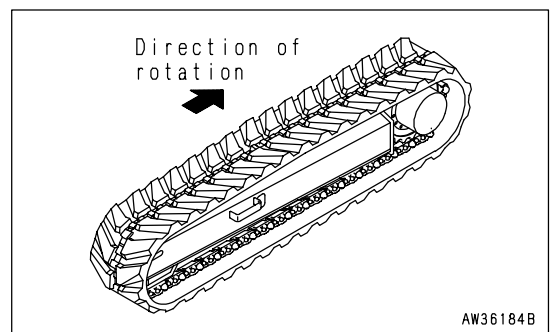


Rubber Shoes Installation

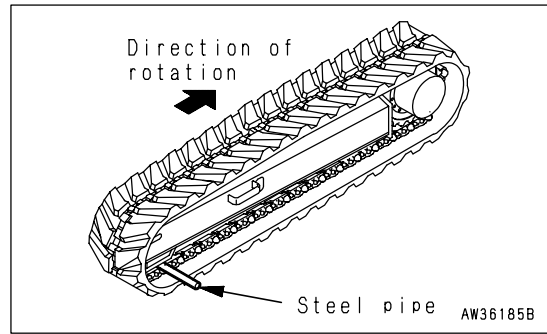
1. Raise the chassis with the boom and arm.
When doing this, operate the levers slowly.



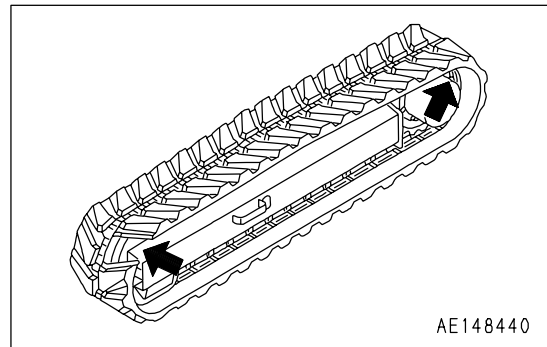
2. Mesh the rubber shoe with the sprocket and fit it over the idler.
3. Rotate the sprocket in reverse, then push in the rubber shoe and stop the rotation.



4. Fit a steel pipe in the rubber shoe, then rotate the sprocket again and fit the rubber shoe securely on the idler.



5. Stop the rotation, and check that the rubber shoe is securely fitted to the sprocket and idler.



6. Adjust the tension of the rubber shoe.
For details, see "CHECK AND ADJUST RUBBER SHOE TENSION (PAGE 4-30)".
7. Check that the track tension is correct and that the rubber shoe is correctly meshed on the sprocket and idler, then lower the machine to the ground.

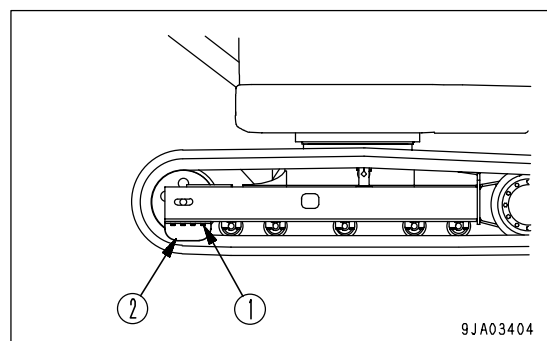
CHANGE STEEL SHOES OR ROAD LINER TO RUBBER SHOES

! WARNING

When changing from the steel shoe or road liner to the rubber shoe, when changing from the rubber shoe to the steel shoe or road liner, it is necessary to remove and adjust the idler cushion, so contact your Komatsu distributor to have the change carried out.

Changing from Steel Shoes or Road Liners to Rubber Shoes

1. Remove idler guard mounting bolts (1), then remove idler guard (2).
2. Remove the steel shoe or road liner and install the rubber shoe.



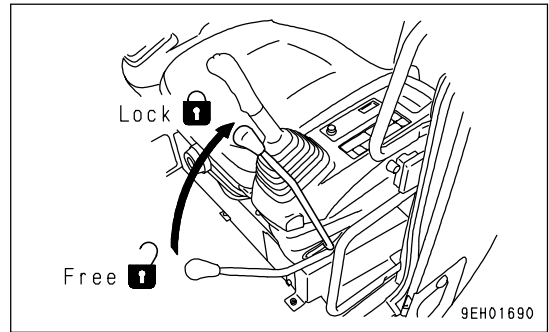
Changing from Rubber Shoes to Steel Shoes or Road Liners

1. Remove the rubber shoe and install the steel shoe or road liner.
2. Install idler guard (2) with idler guard mounting bolts (1).

REPLACE BUCKET TEETH (VERTICAL PIN TYPE)

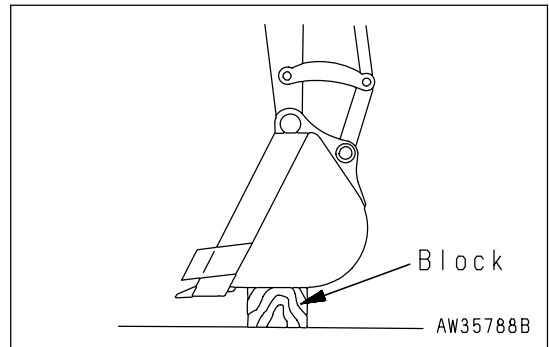
WARNING

- It is dangerous if the work equipment moves by mistake when the teeth are being replaced.
Set the work equipment in a stable condition, then stop the engine and set the safety lock lever securely to the LOCK position.
- The pins can be knocked out only with strong force, so there is a hazard that the pin may fly out. Check that there is no one in the surrounding area.
- There is a hazard that fragments will fly during the replacement work, so always wear protective equipment like safety glasses and gloves.

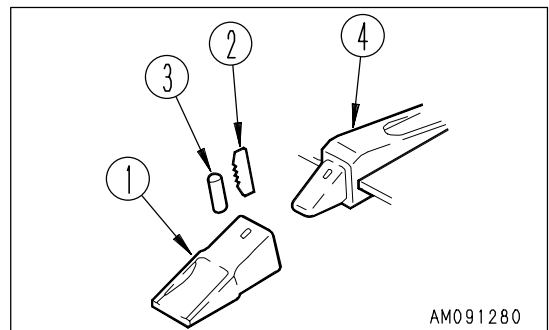


Replace the bucket teeth before the adapter starts to wear.

1. To make it possible to knock out the pin of tooth (1), set the bottom surface of the bucket on a block, check that the work equipment is in a stable condition, then set the safety lock lever to the LOCK position.
Set so that the bottom face of the bucket is horizontal.

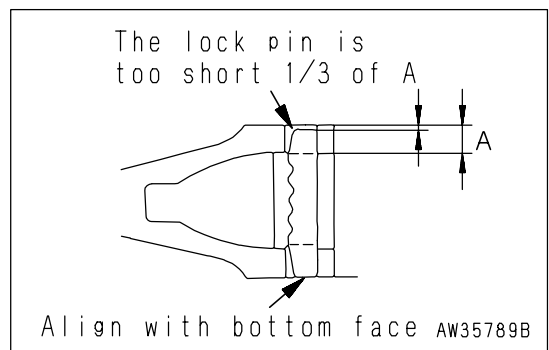


2. Use a hammer and drift to knock out lock pin (2). (If the drift is set against rubber pin lock (3) when it is hit, the rubber pin lock may break. Set it against the back of the pin.)
3. After removing lock pin (2) and rubber pin lock (3), check them.

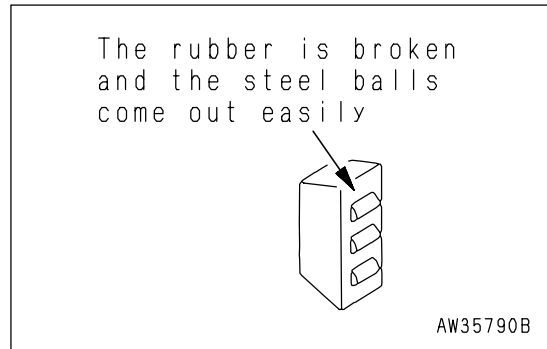


If lock pins and rubber pin locks with the following defects are used, the teeth may come off the bucket. Replace them with new ones.

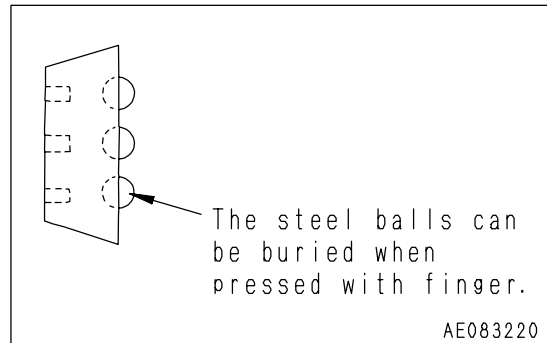
- The lock pin is too short.



- The rubber of the rubber pin lock is torn, and the steel balls may come out.



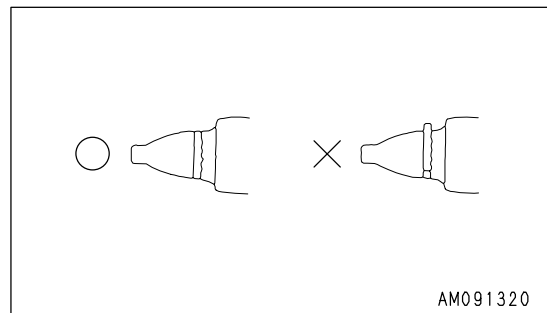
- The steel balls are buried when they are pressed by hand.



4. Clean the surface of adapter (4) and remove the soil with a knife.

5. Use your hand or a hammer to push rubber pin lock (3) into the hole of the adapter.

When doing this, be careful that the rubber pin lock does not fly out from the adapter surface.

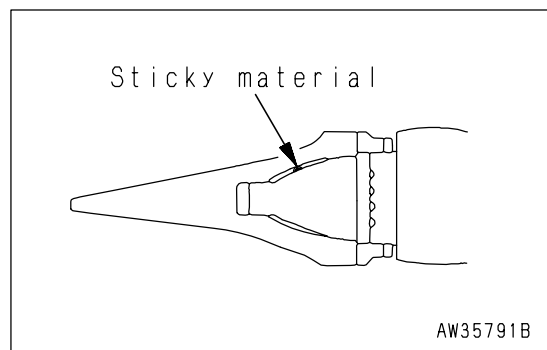


6. Clean the inside of teeth (1), then install it to adapter (4). If there is mud affixed to it or if there are protrusions, the teeth will not enter the adapter properly, and there will not be proper contact at the mating portion.

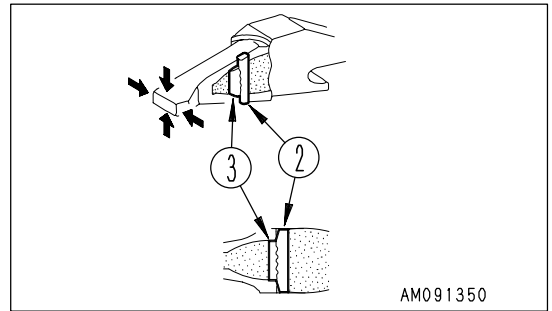
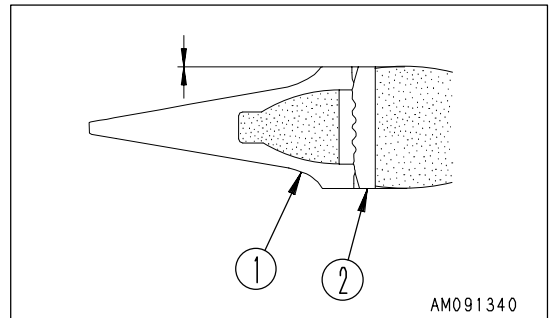
7. Fit teeth (1) to adapter (4), and confirm that when the pointer is pressed strongly, the rear face of the hole for the pin of the teeth is at the same level as the rear face of the hole for the pin of the adapter.

If the rear face of the hole for the pin of teeth (1) is protruding to the front from the rear face of the pin hole for adapter (4), do not try to knock the pin in.

There is something preventing teeth (1) from entering adapter (4) fully, so remove the obstruction. When teeth (1) enters adapter (4) fully, knock in lock pin (2).



8. Insert lock pin (2) in the hole of the teeth and hit it until its top is the same level as the surface of teeth (1).
9. After replacing a bucket tooth, always check the following.
 - 1) After the lock pin has been knocked in completely, check that it is secured by the point and surface.
 - 2) Lightly hit lock pin (2) in the reverse direction from which it was hit in.
 - 3) Lightly hit the tip of the point from above and below, and hit its sides from right and left.
 - 4) Confirm that rubber pin lock (3) and lock pin (2) are set as shown in the figure.

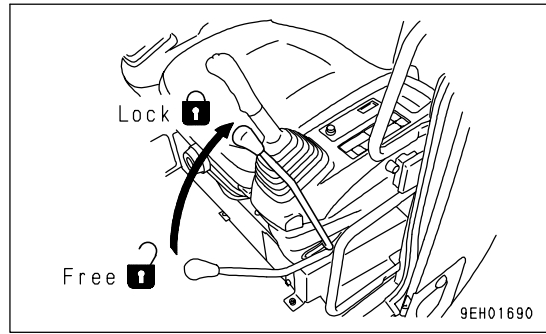


The life of the teeth can be lengthened and the frequency of its replacement can be reduced by turning it upside down so that it will wear evenly.
 Replace the rubber pin lock and locking pin at the same time as replacing the teeth. This makes it possible to prevent the teeth from falling out.

REPLACE BUCKET TEETH (HORIZONTAL PIN TYPE)

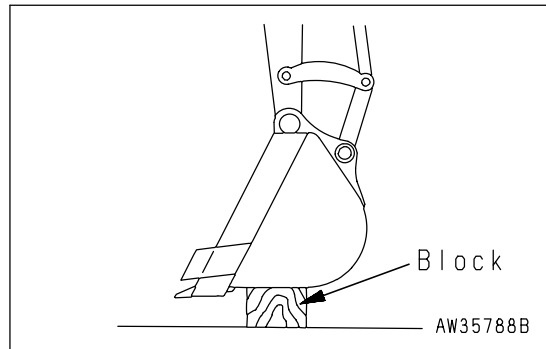
WARNING

- It is dangerous if the work equipment moves by mistake when the teeth are being replaced.
Set the work equipment in a stable condition, then stop the engine and set the safety lock lever securely to the LOCK position.
- The pins can be knocked out only with strong force, so there is a hazard that the pin may fly out. Check that there is no one in the surrounding area.
- There is a hazard that fragments will fly during the replacement work, so always wear protective equipment like safety glasses and gloves.

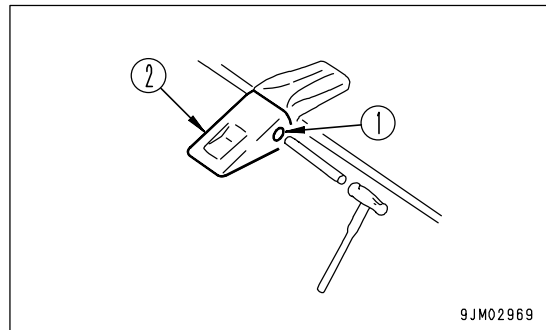


Replace the bucket teeth before the adapter starts to wear.

1. In order to enable tooth (1) pin to be pulled out, put a block under the bucket bottom and make sure that the work equipment rests on it securely. Then move the safety lock lever to the LOCK position. In that case ensure that the bucket is level on the block.



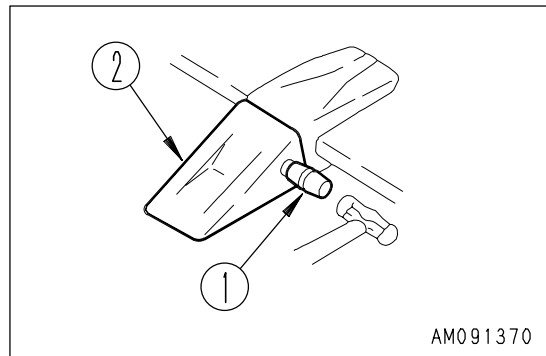
2. Place a bar on the head of pin (1), hit the bar with a hammer to knock out the pin, then remove tooth (2).



REMARK

- If it cannot be removed by this method, for safety reasons, always contact your Komatsu distributor to have the replacement carried out.

3. Clean the mounting face. Fit a new tooth (2) in the adapter, push in pin (1) partially by hand, then lock it with a hammer to install the tooth to the bucket.

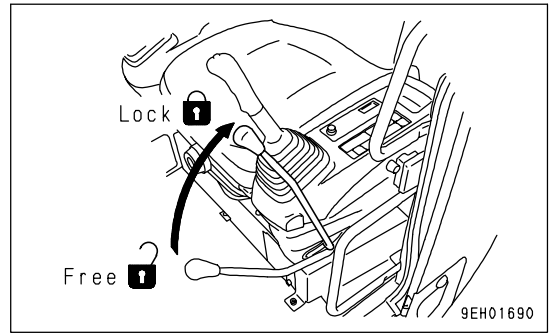


ADJUST BUCKET CLEARANCE

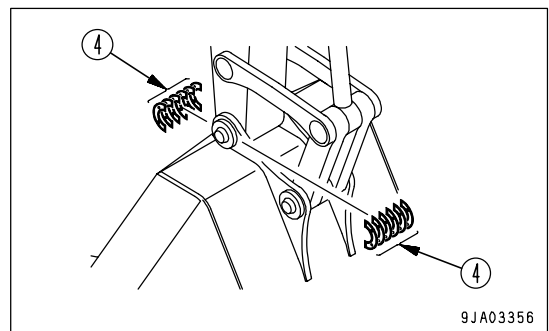
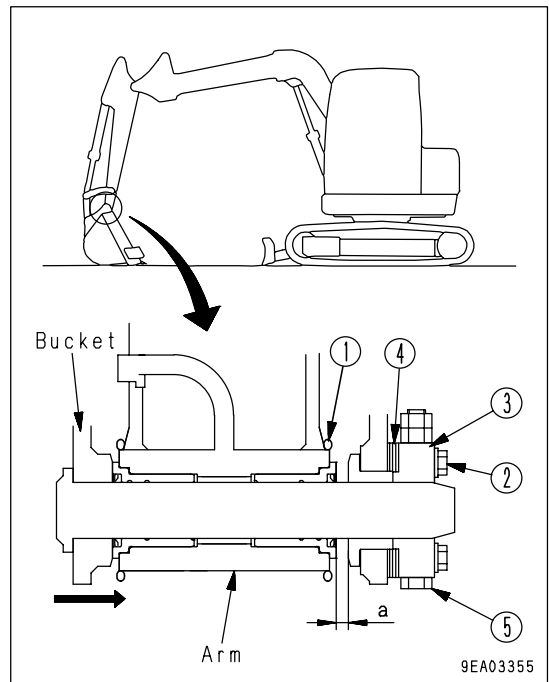
WARNING

It is dangerous if the work equipment moves by mistake while the bucket clearance is being adjusted.

Set the work equipment on the ground in a stable condition, then stop the engine and lock the safety lock lever without fail.



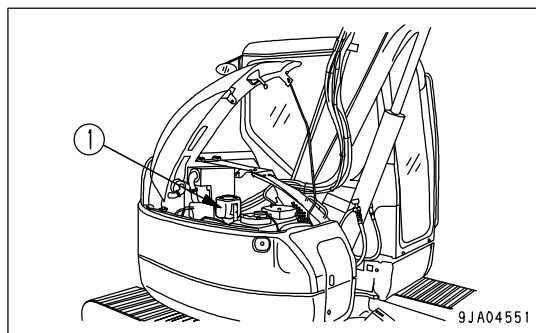
1. Set the work equipment to the position shown in the diagram on the right, then stop the engine and set the lock lever to the LOCK position.
2. Shift O-ring (1) of the linkage and measure the amount of clearance "a".
Measurement is easier if you move the bucket to one side (right side of the diagram) or the other so all the clearance can be measured in one place.
Use a gap (clearance) gauge for easy and accurate measurement.
3. Loosen 4 plate mounting bolts (2), and loosen plate (3).
The shim is a split type, so the operation can be carried out without removing the bolts.
4. Remove as many shims (4) corresponding to clearance amount "a". A pair of shims composes one set and the thickness of each shim is 0.5 mm (0.020 in). In case clearance amount "a" is smaller than a shim, do not attempt to tighten bolt (2) for the adjustment purpose.
5. Tighten the four bolts (2).
If the bolts (2) are too stiff to tighten, pull out pin stopper bolt (5) for easier tightening.



CHECK WINDOW WASHER FLUID LEVEL, ADD FLUID

If there is air in the window washer fluid, check the level of the fluid in window washer tank (1). Add automobile window washer fluid if necessary.

When adding fluid, be careful not to let any dust get in.



Mixture ratio of pure washer fluid and water

The proportion differs according to the ambient temperature, so dilute the washer fluid with water to the following proportions before adding.

Area, season	Proportions	Freezing temperature
Normal	Washer fluid 1/3: water 2/3	-10°C (14°F)
Winter in cold area	Washer fluid 1/2 : water 1/2	-20°C (-4°F)
Winter in extremely cold area	Pure washer fluid	-30°C (-22°F)

There are two types depending on the freezing temperature:

-10°C (14°F) (general use) and -30°C (-22°F) (cold area use), so select according to the area and season.

CHECK AND ADJUST AIR CONDITIONER

(If equipped)

Check level of refrigerant (gas)



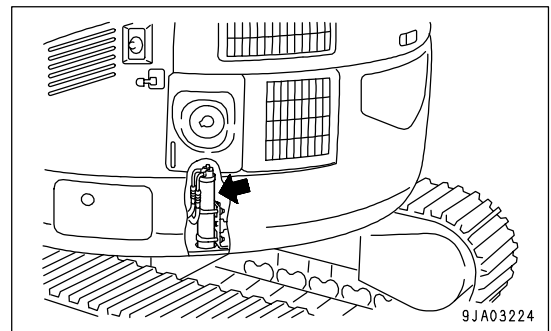
WARNING

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.

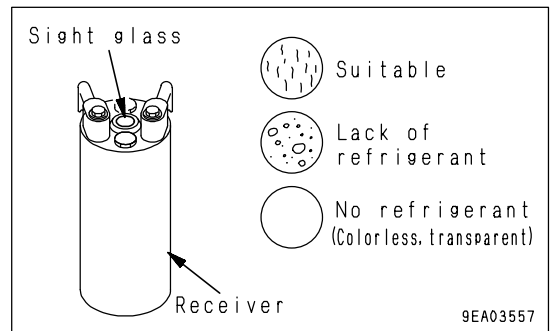
If there is a lack of refrigerant (gas), the cooling performance will be poor. When operating the cooler at high speed with the engine at full throttle, use the receiver sight glass (inspection window) to check the condition of the refrigerant gas (Freon R134a) flowing in the refrigerant circuit.

- 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.



Inspection During Off Season

Even during the off-season, operate the air conditioner for 3 - 5 minutes once a month to maintain the oil film at all parts of the compressor.

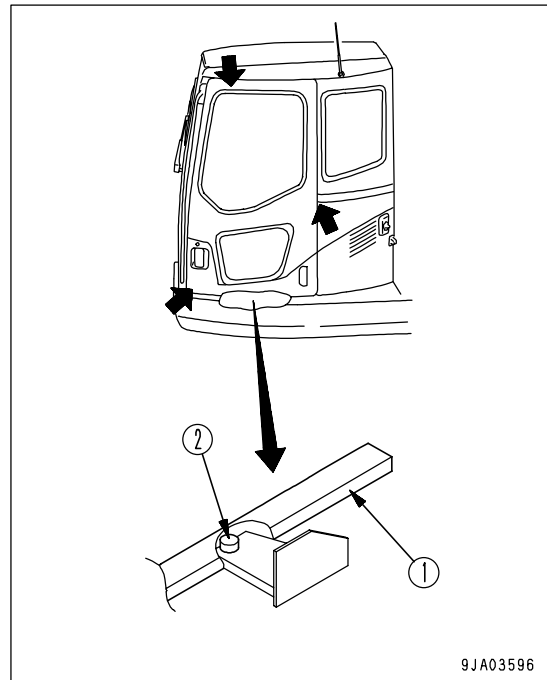
Inspection and Maintenance Items

Check, maintenance items	Content of check, maintenance	Guideline for maintenance interval
Refrigerant (gas)	Charge amount	Twice a year (spring, autumn)
Condenser	Clogged fins	Every 500 hours
Compressor	Operating condition	Every 4000 hours
V-belt	Damage, tension	Every 250 hours
Blower motor, fan	Operating condition (does it make abnormal noise?)	When required
Control mechanism	Operating condition (does it function normally?)	When required
Piping mounts	Mounting condition, looseness at tightening or connecting portions, leakage of gas, damage	When required

CHECK, CLEAN AND LUBRICATE CAB SLIDE DOOR RAIL AND ROLLER

Checking

When opening or closing the slide door, it may sometimes not slide smoothly due to mud stuck to the rail. In that case clean and lubricate slide door rail (1) and roller (2) at three points.



Cleaning

1. Open and close the door, and use a brush to remove any dirt from rail (1).
2. Use a cloth to wipe off any dirt from rail (1).

Greasing

NOTICE

Do not use high-viscosity oil for the lubricant. Use grease only.

1. Spray rail (1) and roller (2) thoroughly with lubricant.
2. After spraying with lubricant, slide the door and check that the door opens and closes smoothly.
If the movement is not smooth, contact your Komatsu distributor for repair.

REPLACE BREAKER CIRCUIT ADDITIONAL OIL FILTER ELEMENT

(If equipped)

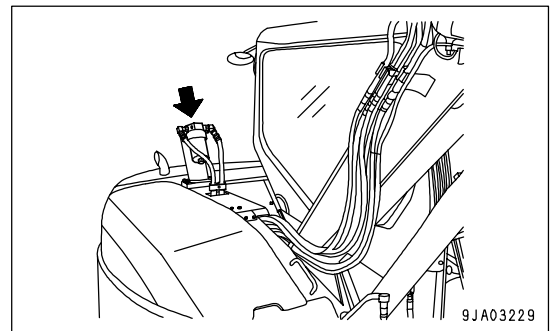
WARNING

- After the engine is stopped, the parts and oil are at high temperature, so there is danger of burns. Wait for the temperature to go down before starting the operation.
- When removing the cap from oil filler port (F), turn it slowly to release the internal pressure, then remove it carefully.

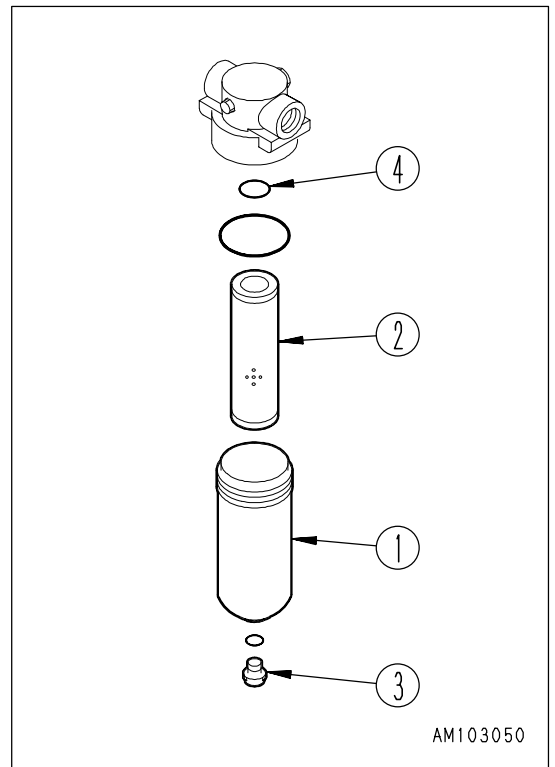
NOTICE

For details of the replacement interval for the element, "MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (PAGE 4-15)".

- Prepare a container to catch the oil.
 1. Place a container under the filter element to catch the oil.
 2. Turn filter case (1) to the left to remove it, then take out element (2).
 3. Remove plug (3) from filter case (1).
 4. Clean the removed parts, then install new element (2) and O-ring (4).
 5. When installing, bring the case into contact with the filter holder, then tighten a further 1/2 turns.



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WASH WASHABLE FLOOR

With the washable floor, it is possible to flush out the dirt on the cab floor directly with water.

! WARNING

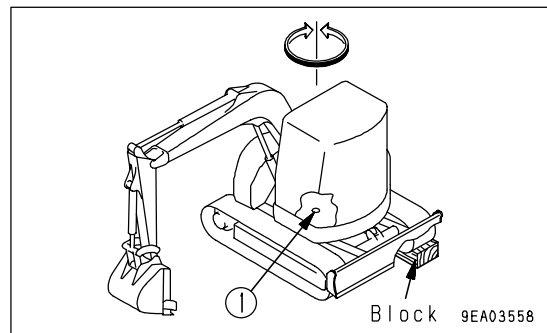
- When setting the machine at an angle, use strong blocks to stabilize the machine and be extremely careful when carrying out the operation.
- If the control levers are touched by mistake, the work equipment or machine may suddenly move, and this may lead to a serious accident. Always set the safety lock lever securely to the LOCK position before standing up from the operator's seat.
- When setting the machine at an angle, use strong blocks to stabilize the machine and be extremely careful when carrying out the operation.
- If the control levers are touched by mistake, the work equipment or machine may suddenly move, and this may lead to a serious accident. Always set the safety lock lever securely to the LOCK position before standing up from the operator's seat.

NOTICE

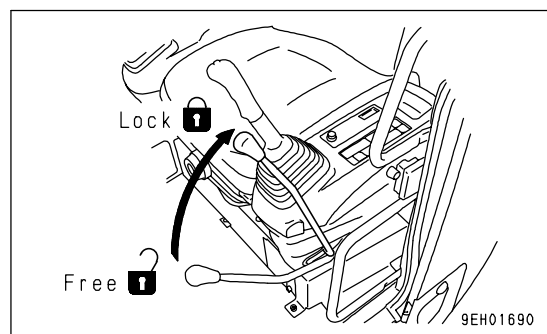
While cleaning the cab floor, take care so that the connector, air conditioner main body and filters may not be splashed with water.

Method of washing

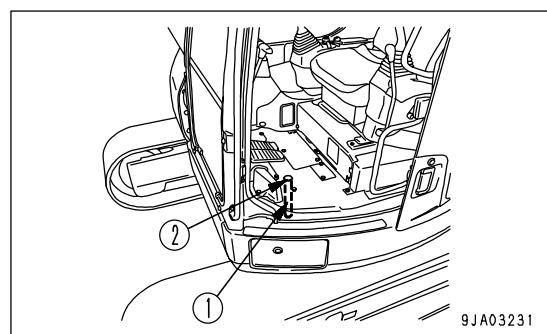
1. Swing the upper structure slowly so that water drain holes (1) in the cab floor are at a low position.
2. Lower the work equipment to the ground and set the machine in a stable condition.



3. Set the safety lock lever to the LOCK position and stop the engine.



4. Remove the floor mat.
5. Remove cap (2).
6. Flush out the dirt on the floor directly with water through water drain hole (1).
7. After completing the washing operation, install cap (2) and floor mat.



BLEEDING AIR FROM HYDRAULIC SYSTEM

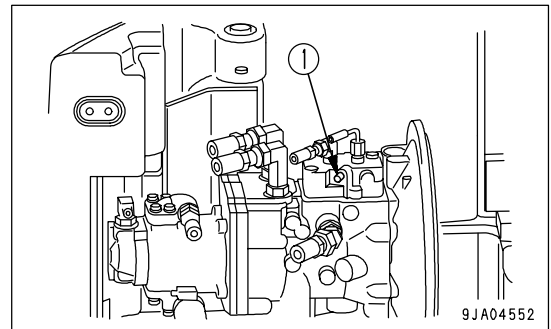
For details, see "STARTING ENGINE (PAGE 3-72)". If it is necessary to refer to the items for starting the engine, moving the machine off, steering, or stopping, see the OPERATION section.

1. Bleeding air from pump

NOTICE

If the pump is operated without filling the pump case with hydraulic oil, there is danger that the pump may be prematurely damaged. Be sure to bleed the air completely.

- 1) Loosen air bleed plug (1) installed to the drain port and check that oil oozes out (air bleeding is completed).
- 2) After completion of the air bleeding operation, tighten the air bleed plug.



2. Bleeding air between pump and hydraulic tank

NOTICE

If the engine is run at high speed without bleeding the air between the pump and hydraulic tank, there will be abnormal generation of heat, and this will lead to premature failure of the pump.

- 1) Start the engine and maintain it at a mid-range speed (1650 rpm). For details, see "STARTING ENGINE (PAGE 3-72)".
- 2) Operate the work equipment slowly for approx. 5 minutes to bleed the air.

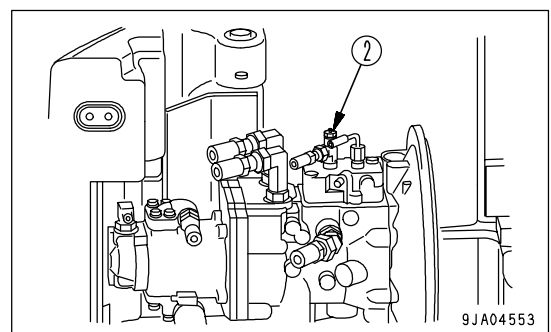
3. Bleeding air from LS circuit

(This work is to be conducted only when any of the hydraulic pump, valve and hoses in the LS circuit is replaced)

NOTICE

Unless air is bled from the LS circuit, malfunction of the work equipment may be invited.

- 1) Loosen air bleeder (2) installed at the LS port of the hydraulic pump.
- 2) Idle the engine for two minutes.
- 3) Continue to operate the bucket for approx. two minutes (extension and retraction to each stroke end).
- 4) Tighten air bleeder (2) after air bleeding has been finished.



4. Bleeding air from cylinders

NOTICE

If the engine is run at high speed immediately after startup or a cylinder is pushed up to its stroke end, air taken inside the cylinder may cause damage to the piston packing.

- 1) Run the engine at a mid-range speed (1650rpm) and extend and retract the cylinders 4 to 5 times to a point 100 mm(3.9in) from the end of the stroke. (Be careful not to operate to the end of the stroke.)
- 2) Next, operate each cylinder 3 to 4 times to the end of its stroke.
- 3) Finally, operate each cylinder 4 to 5 times to the end of its stroke to completely remove the air.

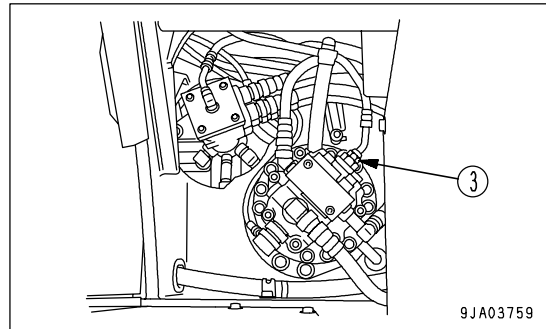
5. Bleeding air from swing motor

(only after draining oil from swing motor case)

NOTICE

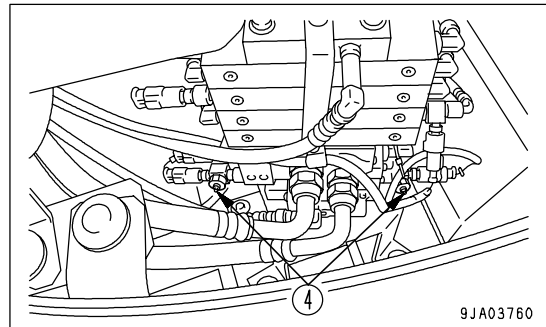
If the air is not bled from the swing motor, the motor bearings may be damaged.

- 1) Loosen hose (3) while keeping the engine running at low idling. Tighten it again once oil starts to flow out. Do not attempt to make a swing movement at that time.
- 2) Run the engine at low idling, and make a swing movement slowly to the right and left more than twice each



6. Bleeding air from swing PPC circuit

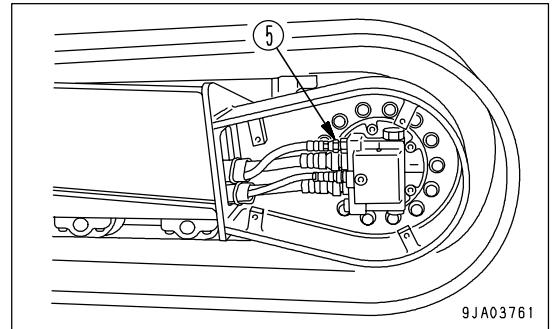
- Bleed air through air bleeder (4) installed to the main valve inside the cover on the right side of machine.



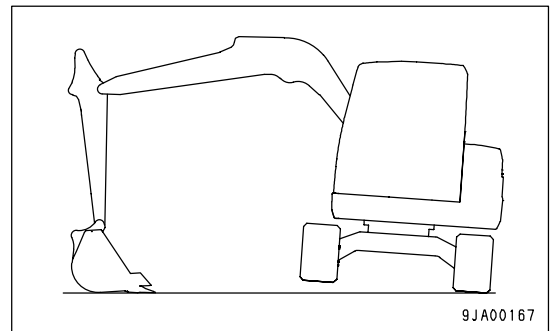
7. Bleeding air from travel motor

(only when oil inside travel motor case has been drained)

- 1) Run the engine at low idling, remove hose (5) from port D, then when the oil has flowed out, tighten it again.



- 2) Run the engine at low idling and swing the work equipment 90° to bring it to the side of the track.
- 3) Jack up the machine until the track is raised slightly from the ground. Rotate the track under no load for 2 minutes. Repeat this procedure on both the left and right sides.



8. Bleeding air from attachment (when installed)

NOTICE

If the attachment maker specifies an air bleeding procedure for the attachment itself, follow the specified procedure to bleed the air.

If a breaker or other attachment has been installed, run the engine at low idling and operate the attachment pedal repeatedly (approx. 10 times) until the air has been bled from the attachment circuit.

NOTICE

- **After completing the air bleeding operation, stop the engine, and leave the machine for 5 minutes before starting operations. This will remove the air bubbles in the oil inside the hydraulic cylinders.**
- **Check that there is no leakage of oil and wipe off any oil that has been spilled.**

CHECK BEFORE STARTING

For details of the following items, see "Checks Before Starting (PAGE 3-58)" in the OPERATION section.

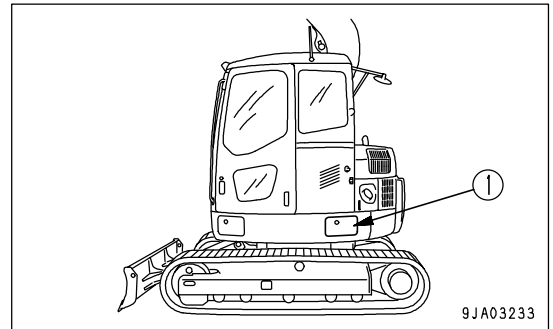
- Check Coolant Level, Add Water
- Check Oil Level In Engine Oil Pan, Add Oil
- Check Fuel Level, Add Fuel
- Check Oil Level In Hydraulic Tank, Add Oil
- Check Dust Indicator
- Check Water Separator
- Check Electric Wirings
- Check Function Of Horn

EVERY 50 HOURS MAINTENANCE

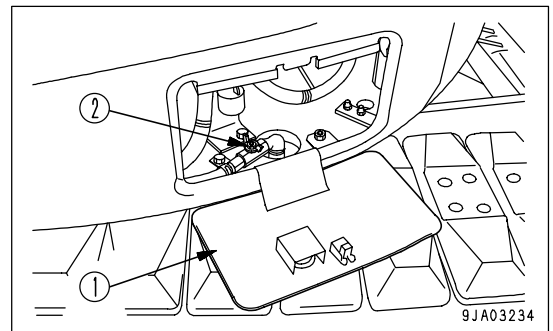
DRAIN WATER FROM FUEL TANK

Carry out this procedure before operating the machine.

- Prepare a container to catch the fuel that is drained.
1. Swing the upper structure so that inspection cover (1) is between the tracks.
 2. Open the inspection cover (1).



3. Open drain valve (2) and drain the sediment and water accumulated at the bottom together with the fuel. When doing this, be careful not to get fuel on yourself.
4. When only clean fuel comes out, close drain valve (2).
5. Close the inspection cover.



EVERY 100 HOURS MAINTENANCE

Maintenance for every 50 hours service should be carried out at the same time.

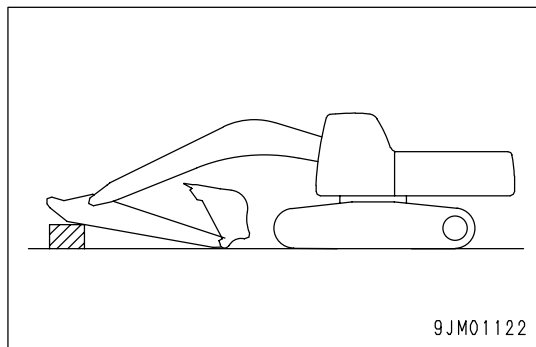
LUBRICATING

NOTICE

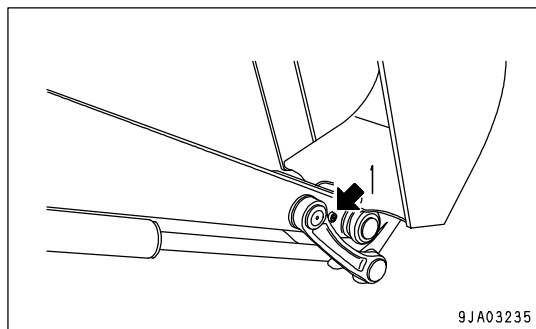
- If any abnormal noise is generated from any greasing point, carry out greasing regardless of the greasing interval.
- Carry out greasing every 10 hours for the first 50 hours on a new machine.
- After the machine was subjected to jobs in the water, be sure to grease the wet pins.

• Prepare a grease gun.

1. Set the machine to the greasing posture shown on the right diagram, lower the work equipment to the ground, then stop the engine.
2. Using a grease pump, pump in grease through the grease fittings shown by arrows.
3. After greasing, wipe off any old grease that was pushed out.



(1) Arm-Bucket coupling pin (1 point)



EVERY 250 HOURS MAINTENANCE

Maintenance for every 50 hours service should be carried out at the same time.

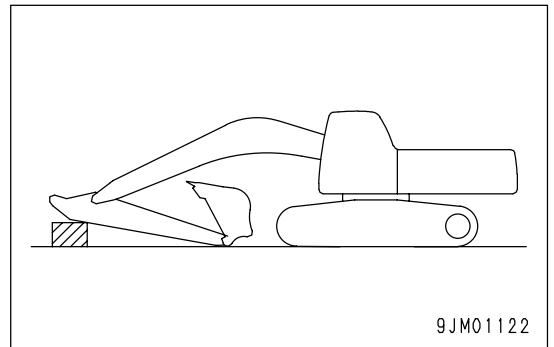
LUBRICATING

NOTICE

- If any abnormal noise is generated from any greasing point, carry out greasing regardless of the greasing interval.
- Carry out greasing every 10 hours for the first 50 hours on a new machine.
- After the machine was subjected to jobs in the water, be sure to grease the wet pins.

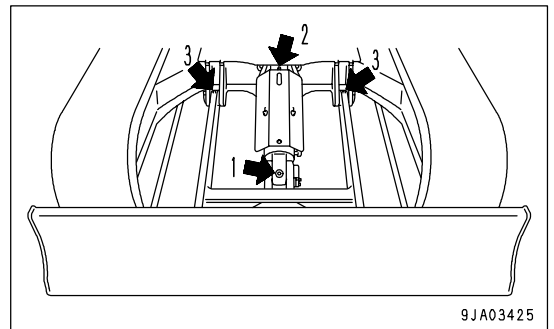
• Prepare a grease gun.

1. Set the machine to the greasing posture shown on the right diagram, lower the work equipment to the ground, then stop the engine.
2. Using a grease pump, pump in grease through the grease fittings shown by arrows.
3. After greasing, wipe off any old grease that was pushed out.

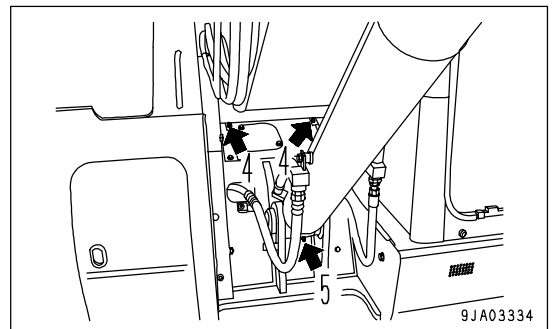


(Only machines with blade specification)

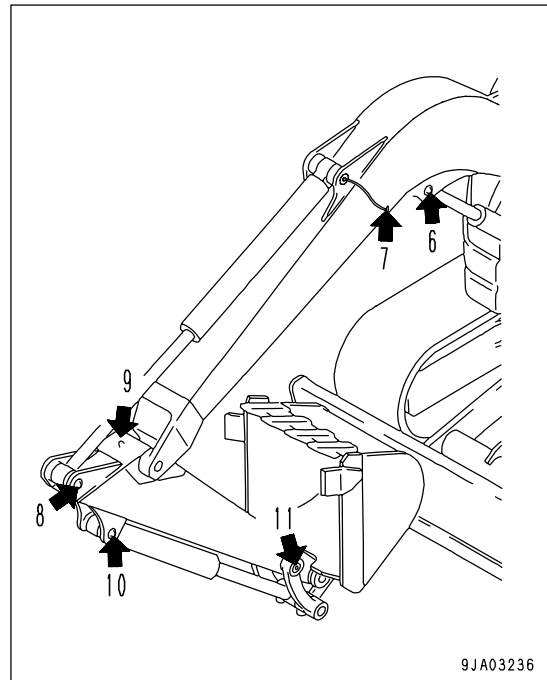
- (1) Blade cylinder foot pin (1 point)
- (2) Blade cylinder rod end pin (1 point)
- (3) Blade foot pin (2 points)



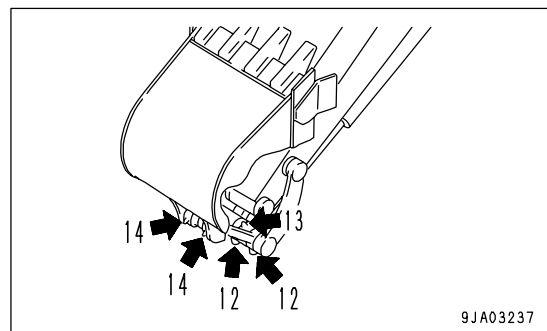
- (4) Boom foot pin (2 points)
- (5) Boom cylinder foot pin (1 point)



- (6) Boom cylinder rod end pin (1 point)
- (7) Arm cylinder foot pin (2 points)
- (8) Arm cylinder rod end pin (1 point)
- (9) Boom-Arm coupling pin (1 point)
- (10) Bucket cylinder foot pin (1 point)
- (11) Arm link pin (1 point)



- (12) Link coupling pin (2 points)
- (13) Bucket cylinder rod end pin (1 point)
- (14) Bucket-Link coupling pin (2 points)
- (15) Arm-Bucket coupling pin (1 point)

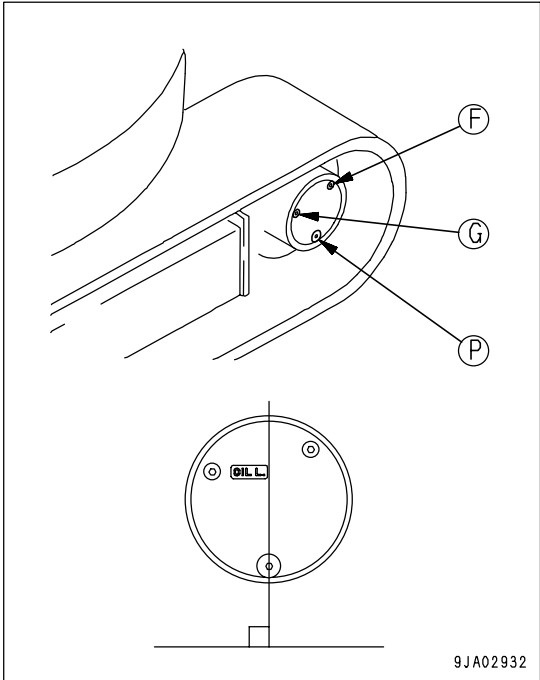


CHECK OIL LEVEL IN FINAL DRIVE CASE, ADD OIL

! WARNING

- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.
- If there is still pressure remaining inside the case, the oil or plug may fly out. Loosen the plug slowly to release the pressure.

- Prepare a container to catch drained oil.
 - Prepare a hexagon wrench.
1. Turn the sprocket so that plug (P) may come to the bottom.
 2. Set the container to catch oil under plug (P).
 3. Remove plug (G) with a hexagonal wrench. Oil level should be near the bottom of the plug hole (G).
 4. If the oil is insufficient, remove plug (F) with a hexagonal wrench, then add oil through plug (F), until oil flows out of level plug hole (G).
 5. After checking the oil level, install plugs (F) and (G).



CHECK LEVEL OF BATTERY ELECTROLYTE

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

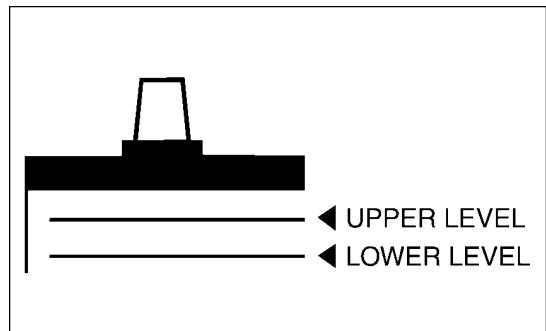
When adding distilled water in cold weather, add it before starting operations in the morning to prevent the electrolyte from freezing.

Inspect the battery electrolyte level at least once a month and follow the basic safety procedures given below.

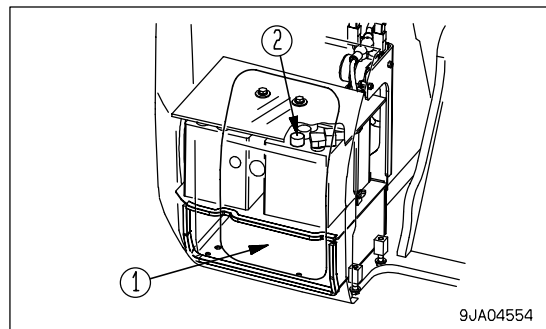
When checking electrolyte level from side of battery

If it is possible to check the electrolyte level from the side of the battery, check as follows.

1. Open battery inspection cover (1) and remove a sheet installed above the battery.
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 (2) and add distilled water to the U.L line.
4. After adding distilled water, tighten cap (2) securely.



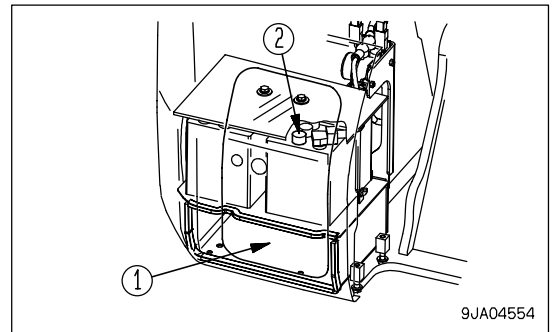
REMARK

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.

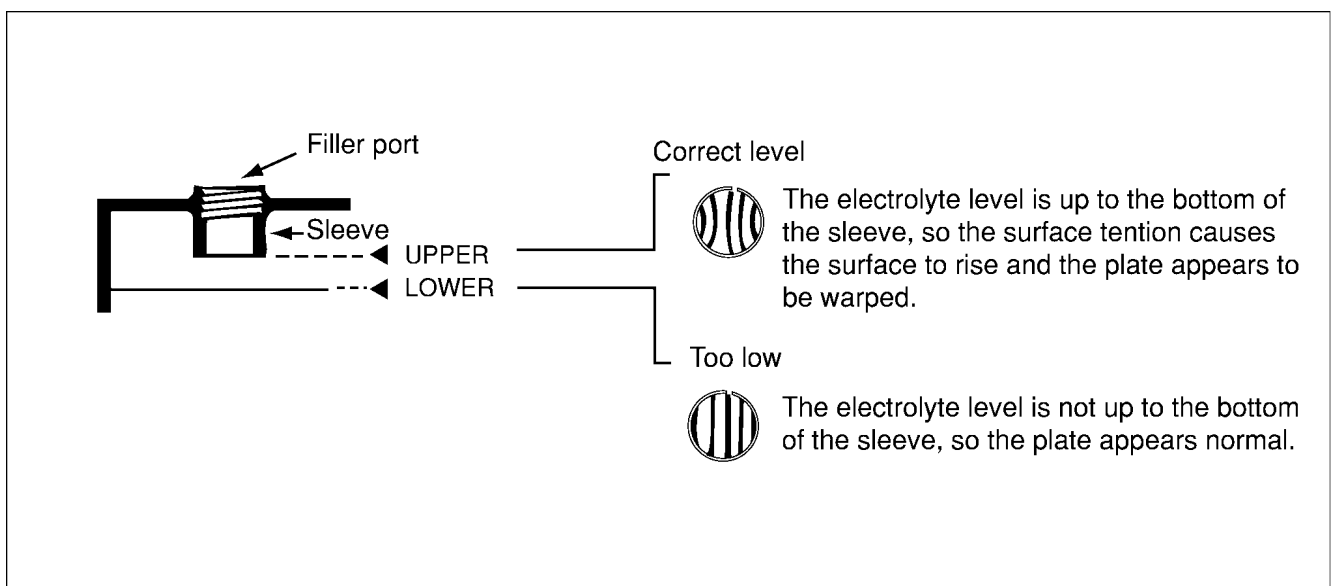
When it is impossible to check electrolyte level from side of battery

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 battery inspection cover (1) and remove a sheet installed above the battery.
2. Remove cap (2) 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.



Use the diagram below for reference, and check if the electrolyte reaches the bottom of the sleeve.



3. After adding distilled water, tighten cap (2) 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.

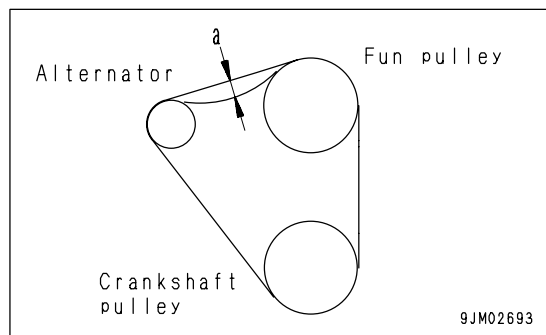
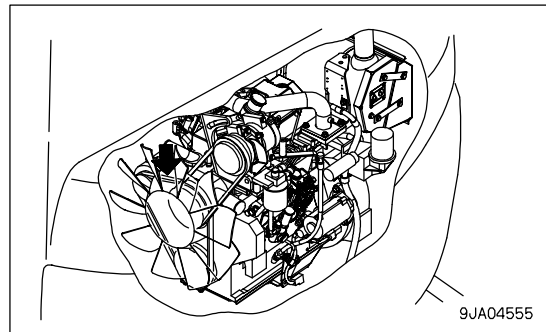
When it is possible to use indicator to check electrolyte level

If it is possible to use an indicator to check the electrolyte level, follow the instructions given.

CHECK AND ADJUST COOLING FAN BELT TENSION

Checking

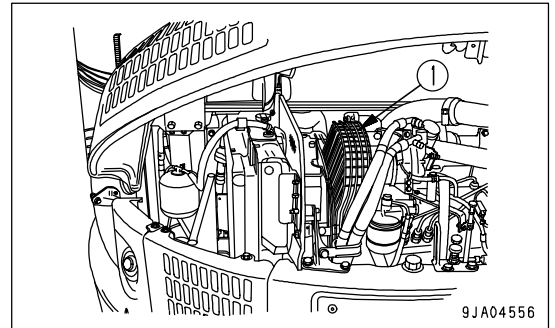
If deflection amount "a" shows approx. 8 mm (0.3 in) when the belt is pressed with a thumb of approx. 58.8 N (6kgf) force at the midpoint between the alternator pulley and the fan pulley, then it is the standard deflection amount.



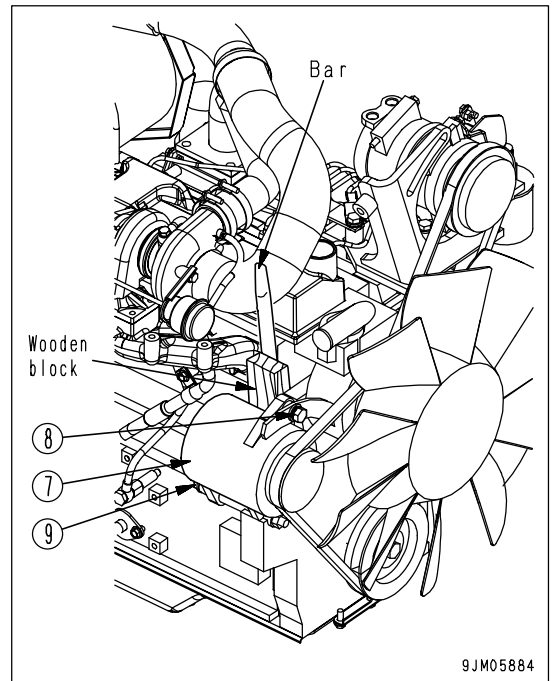
Adjustment

- Prepare a bar.
- Prepare a wooden block.

1. Detach fan guard (1).



2. Insert a bar in between alternator (2) and the cylinder block to secure alternator (2). At that time put a wooden block between the bar and alternator (2) to avoid damage to alternator (2).
3. Loosen alternator securing bolts (3) and adjusting bolt (4).
4. Push alternator (2) to the machine front side, prying with the bar, so that the fan belt deflects by approx. 8 mm (0.315 in) (approx. 58.5 N or 6 kgf), and then tighten adjusting bolt (4).
5. Tighten alternator securing bolts (3).



NOTICE

- **Check each pulley for damage, wear of the V-groove, and wear of the V-belt. In particular, be sure to check that the V-belt is not touching the bottom of the V-groove.**
- **If the belt is stretched and there is no allowance for adjustment, or if it is cut or cracked, please contact your Komatsu distributor for replacement.**

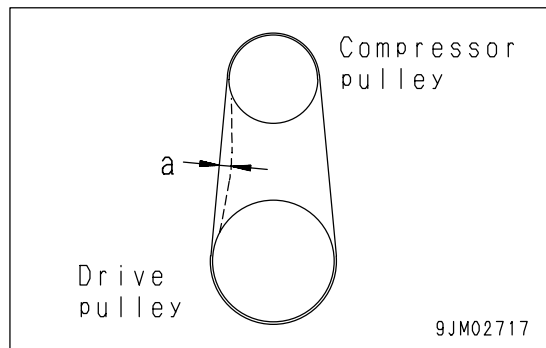
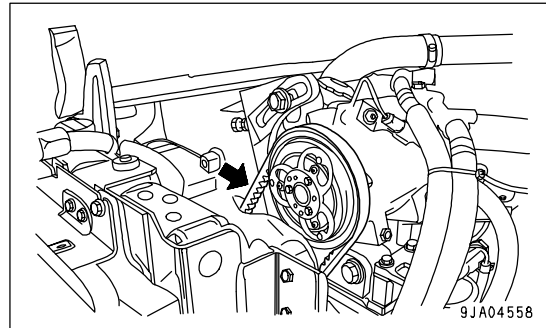
6. Install fan guard (1).

CHECK AIR CONDITIONER COMPRESSOR BELT TENSION, ADJUST

(If equipped)

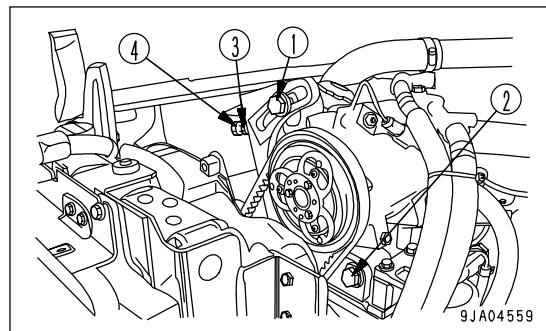
Checking

Press the belt at a point midway between the fan pulley and compressor pulley with a finger force of approx. 58.8 N (6 kgf) and check that the deflection is 10 to 12 mm (0.4 to 0.5 in).



Adjustment

1. Loosen bolts (1) and (2).
2. Loosen nut (3) and tighten bolt (4) until fan belt deflection of 10 to 12 mm (0.4 to 0.5 in) (approx. 58.8 N or approx. 6 kgf) is obtained.
3. Tighten bolts (1) and (2) to fasten the compressor.
4. Tighten nut (3) after loosening bolt (4) by 2 to 3 turns, and then retighten bolt (4).



NOTICE

- Check each pulley for damage, wear of the V-groove, and wear of the V-belt. In particular, be sure to check that the V-belt is not touching the bottom of the V-groove.
- In case any of the following occurs, ask the Komatsu distributor in your territory to replace the belts with new ones.
 - The fan belt has elongated, leaving little allowance for adjustment.
 - A cut or crack is found on the belt.
 - Slipping or creaking sound is heard to come from the belt.
- When the new V-belt is set, readjust it after operation for an hour.

EVERY 500 HOURS MAINTENANCE

Maintenance for every 50, 100 and 250 hours service should be carried out at the same time.

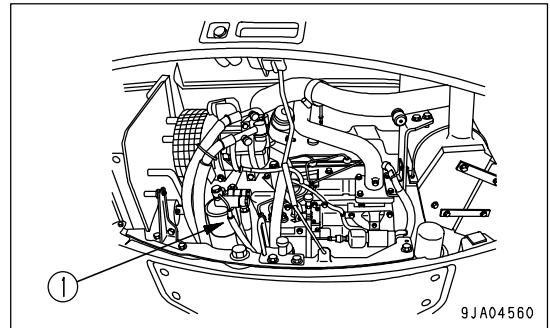
REPLACE FUEL FILTER CARTRIDGE



WARNING

- Engine is at high temperature immediately after the machine has been operated. Wait for engine to cool down before replacing the filter.
- Do not bring fire or sparks near the fuel.

- Prepare a filter wrench for fuel filter element.
- Prepare for cloth.
 1. Spread the cloth beneath the filter cartridge.
 2. Using a filter wrench, turn filter cartridge (1) counterclockwise to remove it.
 3. Clean the filter holder, fill a new filter cartridge with clean fuel, coat the packing surface with engine oil, then install it to the filter holder.
 4. When installing, screw in cartridge until seal comes in contact with sealing surface, then tighten approx. 2/3 turn.



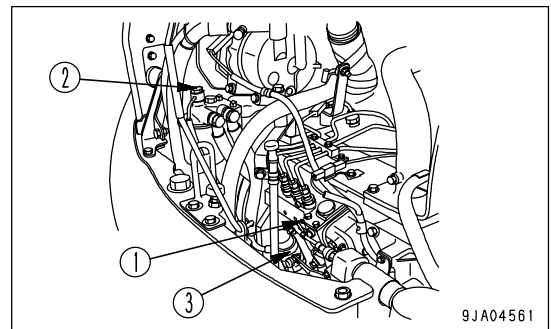
NOTICE

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 the fuel filter element, bleed air.
For details of the procedure, see "Air Bleeding (PAGE 4-59)".
6. After replacement of the filter cartridge, start the engine and check it for possible oil seepage from the filter seal. If oil leaks, check the filter cartridge tightening condition and retighten it. Should oil still leak, remove the filter cartridge again in the sequence of Item 1 and 2 above, and check the packing surface for any damage or whether some foreign material has got caught.
If any of the cases is noticed, replace the packing with new one and repeat the steps in Item 3 through 6 above.

Air Bleeding

1. Fill the fuel tank.
2. Loosen air bleed plug (1) and joint bolt (2).
3. Loosen knob of feed pump (3), pump it up and down, and continue to make the fuel overflow until no more bubbles come out from joint bolt (2).
4. Tighten joint bolt (2) and air bleed plug (1).



REMARK

When the machine has run out of fuel, carry out the same procedure, to bleed the air.

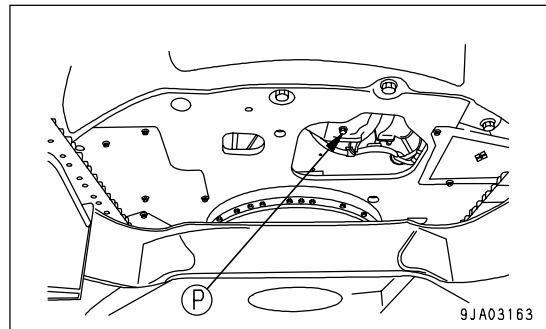
CHANGE OIL IN ENGINE OIL PAN, REPLACE ENGINE OIL FILTER CARTRIDGE

! WARNING

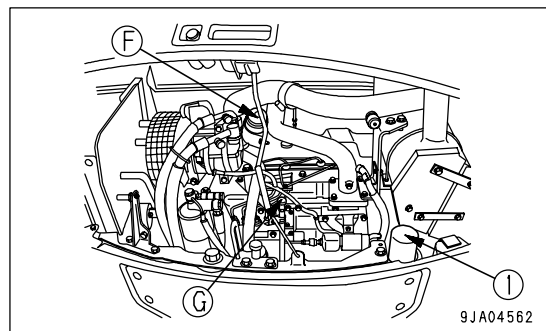
The parts and oil are at high temperature immediately after the engine is stopped, and may cause serious burns. Wait for the temperature to go down before starting the operation.

- Refill capacity: 7 liters (1.85 US gal)
- Filter wrench

1. Set a container to catch the oil immediately under the drain plug (P) at the bottom of the machine.
2. Remove drain plug (P) slowly to avoid getting oil on yourself, and drain the oil.
3. Check the drained oil, and if there are excessive metal particles or foreign material, please contact your Komatsu distributor.
4. Install drain plug (P).

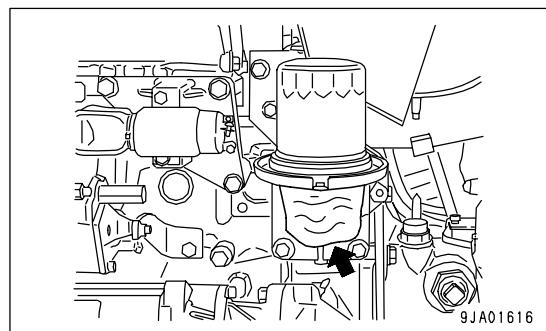


5. Open the engine hood, then using a filter wrench, turn filter cartridge (1) counterclockwise to remove it.



REMARK

Put a cloth in contact with the notched part of the oil container guide. This makes it possible to prevent the area around the filter holder from becoming dirty.



6. Clean the filter holder, then coat the thread and the packing portion of the new filter cartridge with clean engine oil (or coat thinly with grease), and install.

REMARK

Confirm that no remnants of old packing still adhere to the filter holder as this may result in oil leakage. Check that there is no old packing affixed to the filter holder. If there is any old packing affixed to the filter, it will cause leakage of oil.

7. When installing, bring the packing surface into contact with the seal surface of the filter holder, then tighten a further 1/2 turns.

8. After replacing the filter cartridge, add engine oil through oil filler port (F) so that the oil level is between the H and L marks on dipstick (G).
9. Run the engine idle for a while, then stop the engine and confirm that the oil level is between the H and L lines according to "Check Oil Level In Engine Oil Pan, Add Oil (PAGE 3-59)".

CLEAN INTERNAL AND EXTERNAL AIR FILTERS OF AIR CONDITIONER

(If equipped)

 **WARNING**

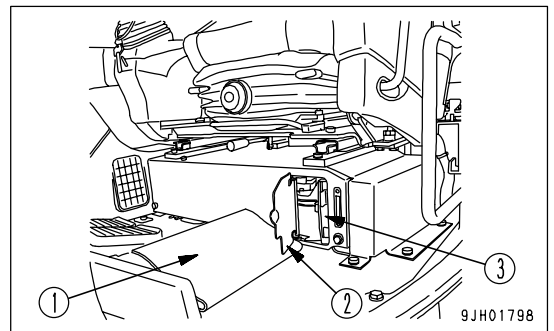
If compressed air is used, there is danger that dirt may fly and cause personal injury. Always wear safety glasses, dust mask, and other protective equipment.

NOTICE

- The guide for cleaning the filter is 500 hours, but if the machine is used on an extremely dusty jobsite, reduce the maintenance interval and clean the filter more frequently.
- When washing the floor, be careful not to get water on the air conditioner system.

Cleaning reticulated air filter

1. Roll up floor mat (1) on the front left part of the floor in the operator's cab, and open cover (2).
2. Take out internal filter (3).
3. Clean internal filter (3) with compressed air. If there is oil stuck to the filter or it is extremely dirty, wash it in a neutral agent. After washing, dry it thoroughly before using it again.



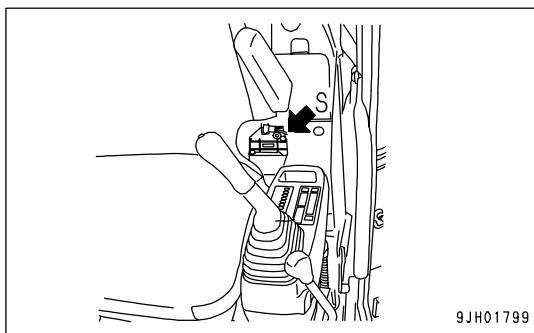
REMARK

If the clogging of the filter cannot be removed by blowing it with compressed air or washing in water, replace the filter with a new one.

4. Install cleaned filter (3), close cover (2) and spread floor mat (1) flat.

Cleaning fresh air filter

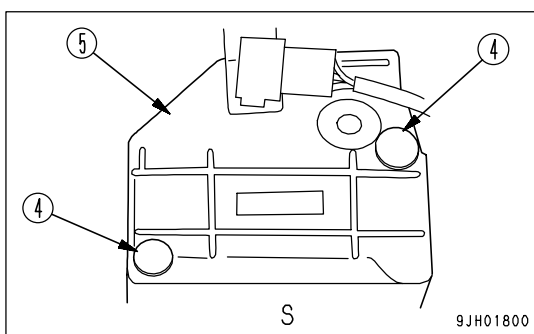
1. Pull up pop-up rivet (4) of the air intake duct at the left rear of the operator's seat. Cover (5) will be released automatically.
2. Pull up external filter (6).
3. Clean external filter (6) by blowing it with compressed air. If there is oil stuck to the filter or it is extremely dirty, wash it in a neutral agent. After washing, dry it thoroughly before using it again.



REMARK

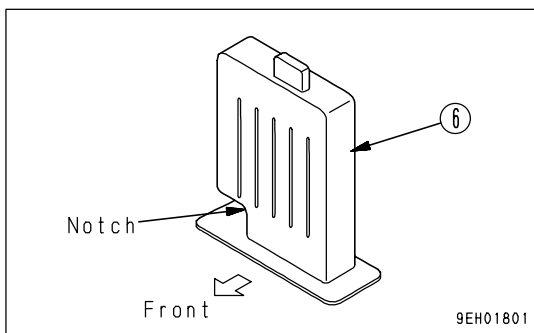
If the clogging of the filter cannot be removed by blowing it with compressed air or washing in water, replace the filter with a new one.

4. Install cleaned filter (6) and then fix cover (5).



NOTICE

Insert filter (6), paying attention to the top and bottom sides.



CLEAN, CHECK RADIATOR FINS, OIL COOLER FINS AND CONDENSER FINS

! WARNING

If compressed air, high-pressure water, or steam hit your body directly, or they cause dirt or dust to be blown up, there is a hazard of serious injury. Always use safety glasses, dust mask, or other protective equipment.

NOTICE

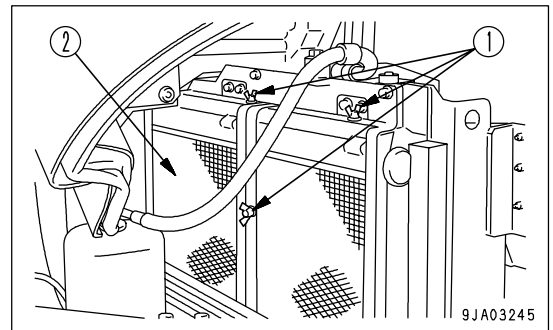
When use the compressed air, keep a distance from air nozzle, to prevents damage to the fins.

To prevent damage to the fins, apply compressed air from and appropriate distance. Damaged fins may cause water leakage or overheating. In a dusty site, check the fins daily, irrespective of the maintenance interval.

Net - Clean

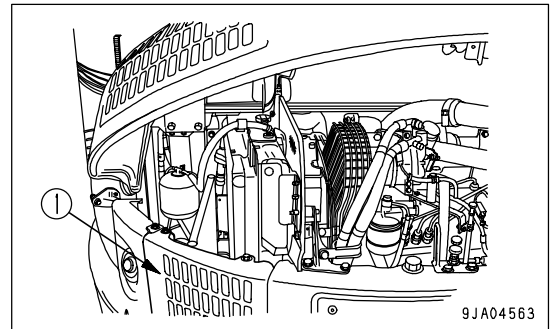
(If equipped)

1. Open engine hood.
2. Remove screws (1) and take out net (2).
3. Clean net (2), put it back to the original position and fix it with screw s (1).

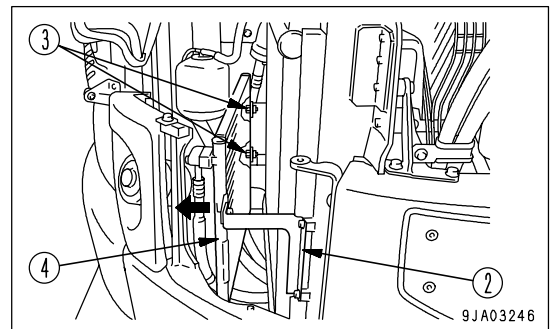


Fins - Clean

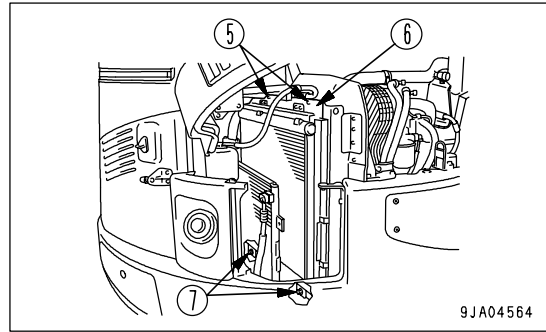
1. Open engine hood.
2. Remove cover (1).



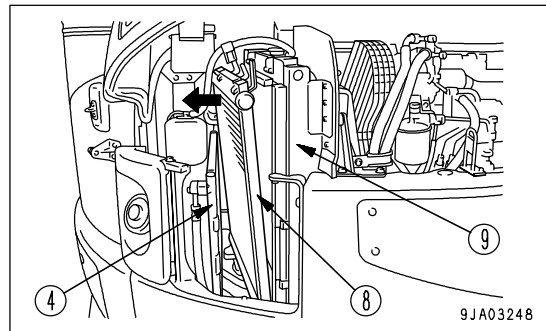
3. Remove condenser securing bracket (2).
4. Loosen two condenser securing bolts (3) in the innermost part and tilt condenser (4).



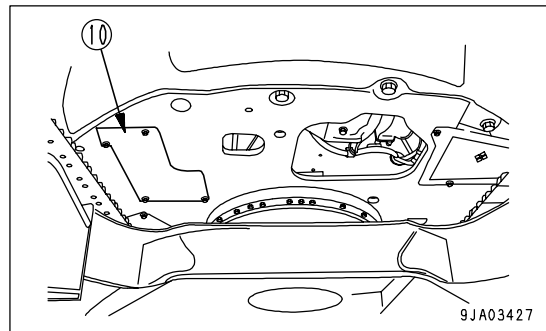
5. Remove two oil cooler securing bolts (5) on the upper side and bracket (6).
6. Loosen two oil cooler securing bolts (7) on the lower side.



7. Tilt oil cooler (8) to create some space between oil cooler (8) and radiator (9).
8. Apply compressed air to radiator fin (9), oil cooler fin (5) and condenser fin (4) to blow off the clogged dirt, dust and shreds of dry leaves. Steam or water may be used instead of compressed air.



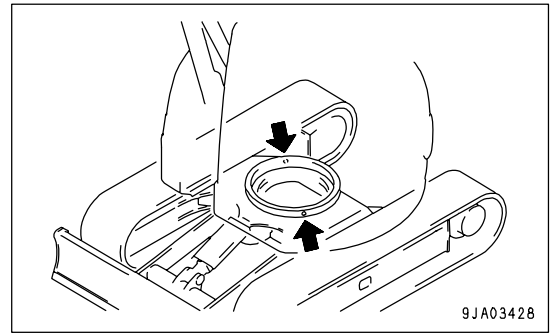
9. Detach machine undercover (10) and sweep out the dirt, dust and shreds of dry leaves fallen on the bottom.



10. 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.
11. Install all the detached parts again as originally installed.

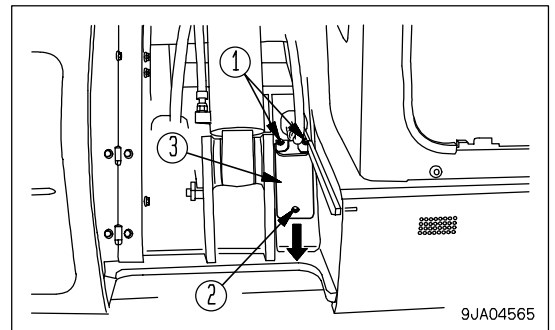
LUBRICATE SWING CIRCLE

1. Lower the work equipment to the ground.
2. Using a grease gun, pump in grease through the grease fittings shown by arrows. (2 points)
3. After greasing, wipe off any old grease that was pushed out.



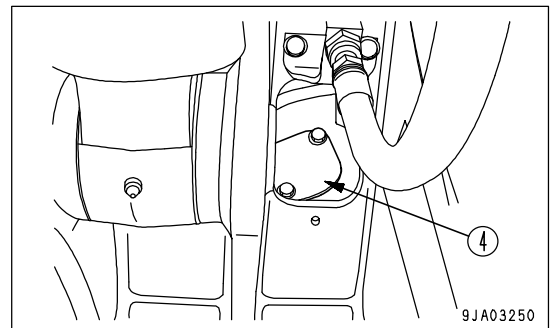
CHECK SWING PINION GREASE LEVEL, ADD GREASE

- Prepare a scale.
1. Loosen bolts (1) to remove bolt (2).
 2. Detach cover (3) by pull it down.



3. Remove bolts (2 bolts) on the top of the revolving frame and remove cover (4).
4. Check that grease is inside.
5. Check if the grease is milky white. If it is milky white, it is necessary to change the grease. Please contact your Komatsu distributor.

The total amount of grease is 5.5 liters (5 kg) [1.45 US gal, (11.03 lb)].



6. Install grease filler cover (4) and cover (3).

EVERY 1000 HOURS MAINTENANCE

Maintenance for every 50, 100, 250 and 500 hours service should be carried out at the same time.

REPLACE HYDRAULIC OIL FILTER ELEMENT

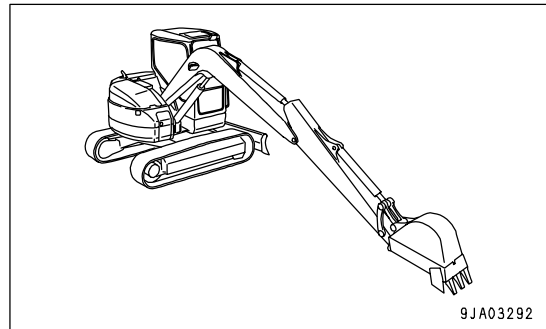
WARNING

- 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.

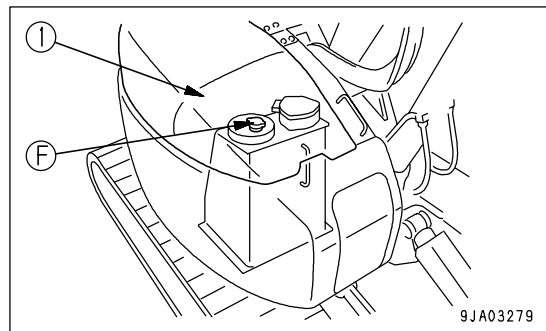
NOTICE

If the machine is equipped with a hydraulic breaker, the hydraulic oil will deteriorate much faster than during normal bucket operations. For details, see "MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (PAGE 4-15)" when carrying out maintenance.

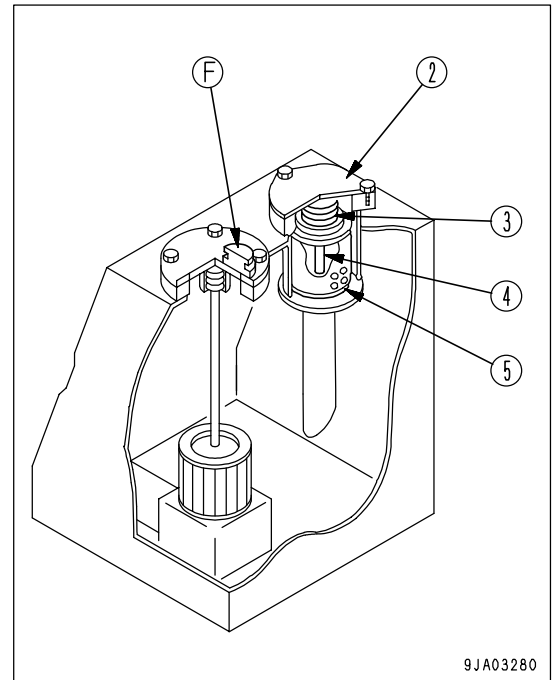
1. Retract the arm and bucket cylinders, then lower the boom and put the teeth in contact with the ground.
2. Lower the blade.



3. Open mud cover (1).
4. Remove the cap from oil filler (F), and release the internal pressure.



5. Loosen 3 bolts, then remove cover (2). When doing this , may fly out under, the force of spring (3), so hold the cover down when removing the bolts.
6. After removing spring (3) and vlve (4),take out element (5).
7. Clean the rempved parts in diesel oil.
8. Install the new element in the place where old element (5) was installed.
Check the O-ring fitted to cover (2), and if it is scratched or damaged, replace it with a new O-ring.
9. Set valve (4) and spring (3) on top of the element.
10. Set cover (2) in position, push it down by hand, and install the cover (2) with the mounting bolts.
11. Install oil filler cap (F), then install cover (1).
12. To bleed the air, start the engine according to "STARTING ENGINE (PAGE 3-72)" and run the engine at low idling for 10 minutes.
13. Stop the engine.



REMARK

Wait for at least 5 minutes after stopping the eigne to eliminate bubbles in the oil inside the tank.

14. Check for oil leakage and wipe off any spilled oil.

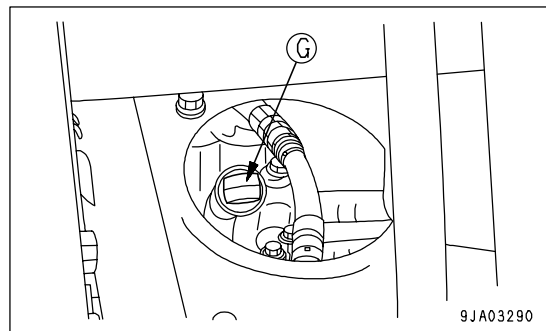
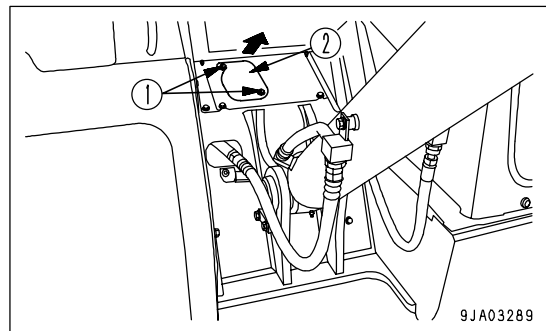
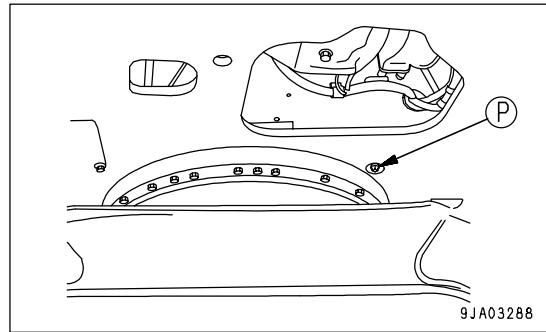
CHANGE OIL IN SWING MACHINERY CASE

! 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 starting the operation.

- Refill capacity: 2.0 liters (0.53 US gal)

1. Set a container to catch the oil immediately under the drain plug (P) at the bottom of the machine.
2. Loosen drain plug (P) on the machine underside to drain oil, and tighten it again after the draining.
Tightening torque of drain plug (P) is 44 to 93 N·m (4.5 to 9.5 Kgf·m, 32.5 to 68.7 lbft).
3. Loosen bolt (1) and slide cover (2).
4. Add the specified amount of engine oil through dipstick (G) insert port.
5. Wipe off oil on the dipstick (G) with cloth.
6. Insert dipstick (G) fully in the oil filler pipe, then take it out again.
7. The oil should be between the H and L marks on dipstick (G).
If the oil is below the L mark, add engine oil through the dipstick insertion port.
8. If the oil is above the H mark, drain the excess engine oil from drain plug (P), and check the oil level again.



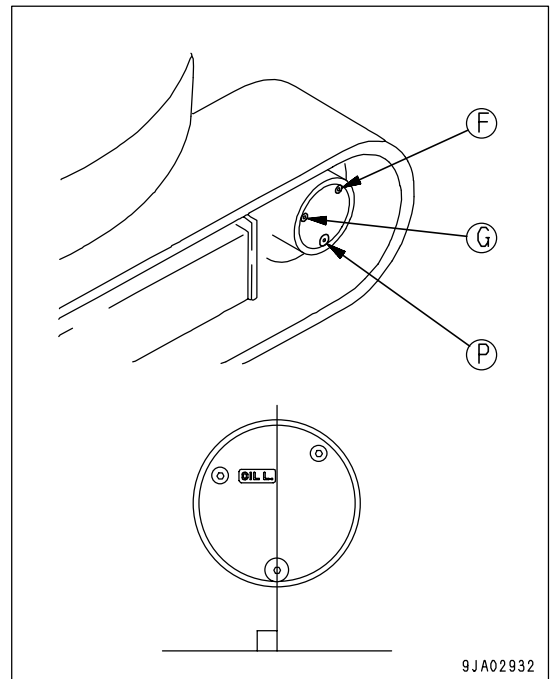
CHANGE OIL IN FINAL DRIVE CASE

! WARNING

- The oil is at high temperature immediately after the machine has been operated. Wait for the oil to cool down before starting the operation.
- If there is still pressure remaining inside the case, the oil or plug may fly out. Loosen the plug slowly to release the pressure.

- Refill capacity (each): 1.3 liters (0.34 US gal)
- Prepare a hexagon wrench

1. Turn the sprocket so that plug (P) may come to the bottom.
2. Set the container to catch oil under plug (P).
3. Remove plugs (P), (G) and (F) with hexagonal wrench to drain the oil.
4. Tighten plug (P).
5. Add oil through the hole of plug (F) up to the refill level.
6. After the oil flows out of the hole plug (G), install plugs (G) and (F).



EVERY 2000 HOURS MAINTENANCE

Maintenance for every 50, 100, 250, 500 and 1000 hours service should be carried out at the same time.

CHECK PTO GEAR CASE, ADD OIL

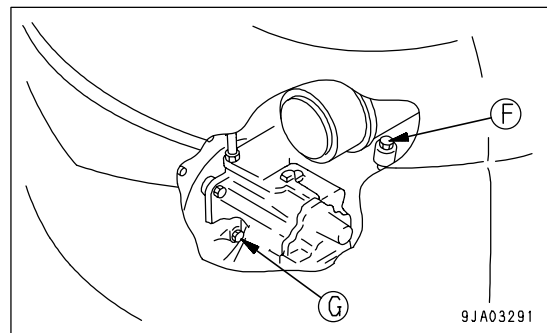


WARNING

- 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.
- If there is still pressure remaining inside the case, the oil or plug may fly out. Loosen the plug slowly to release the pressure.

• Refill capacity: 0.4 liters (0.11 US gal)

1. Remove oil inspection plug (G) and check that the oil is near the bottom of the check hole. If the oil level is low, add oil through oil filler (F) until the oil level is close to the bottom of the hole of plug hole.
2. Install plug (G).



CLEAN, CHECK TURBOCHARGER

Contact your Komatsu distributor for cleaning and inspection.

CHECK ALTERNATOR, STARTING MOTOR

The brush may be worn or the bearing may have run out of grease, so contact your Komatsu distributor for inspection or repair.

If the engine is started frequently, have this inspection carried out every 1000 hours.

CHECK ENGINE VALVE CLEARANCE, ADJUST

As special tool is required for removing and adjusting the parts, you shall request Komatsu distributor for service.

EVERY 4000 HOURS MAINTENANCE

Maintenance for every 50, 100, 250, 500, 1000 and 2000 hours service should be carried out at the same time.

CHECK WATER PUMP

Check that there is no play in the pulley, leakage of oil or water, or clogging of the drain hole. If any abnormality is found, please contact your Komatsu distributor for repairs or replacement.

EVERY 5000 HOURS MAINTENANCE

Maintenance for every 50, 100, 250, 500 and 1000 hours service should be carried out at the same time.

CHANGE OIL IN HYDRAULIC TANK, CLEAN STRAINER



WARNING

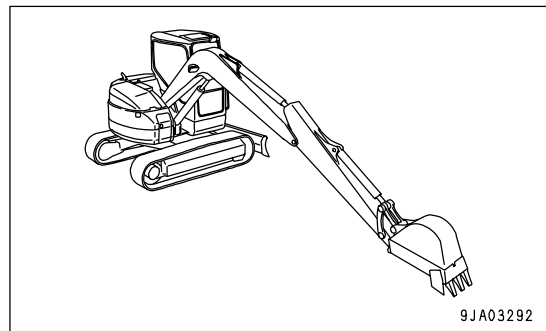
- The parts and oil are at high temperature after the engine is stopped, and may cause burns. Wait for the temperature to go down before starting the work.
- When removing the oil filler cap, turn it slowly to release the internal pressure, then remove it.

NOTICE

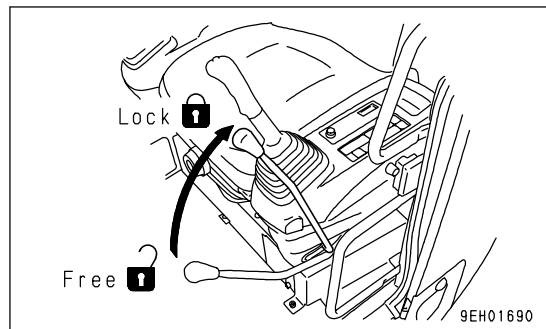
If the machine is equipped with a hydraulic breaker, the hydraulic oil will deteriorate much faster than during normal bucket operations. For details, see "MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (PAGE 4-15)" when carrying out maintenance.

- Refill capacity: 64 liters (16.91 US gal)
- Prepare a handle (for the socket wrench).

1. Swing so that the drain plug at the bottom of the hydraulic tank is in the middle between the left and right tracks.
2. Retract the arm and bucket cylinders, then lower the boom and put the teeth in contact with the ground.
3. Lower the blade.



4. Set the safety lock lever to the LOCK position and stop the engine.



5. Open mud cover (1), then remove the cap of oil filler (F) to release the internal pressure.

6. Place a container under the drain plug which is located on the machine underside. Then remove drain plug (P), using a handle, and drain oil.

At that time, check the O-ring fitted to drain plug (P) and replace it with a new one, if any damage is found on it. After draining oil, tighten drain plug (P) again.

Tightening torque of the drain plug: $68.6 \pm 9.81 \text{ N}\cdot\text{m}$
 $(7 \pm 1 \text{ Kg}\cdot\text{m}, 51 \pm 7 \text{ lbft})$

- Take care not to get oil on yourself when you remove drain plug (P).

7. Loosen 4 bolts, then remove cover (2).

When doing this, the cover may fly out under the force of spring (3), so push the cover down when removing the bolts.

8. Pull up the top of rod (4), and remove spring (3) and strainer (4).

9. Remove the dirt stuck to strainer (5), then wash it in clean diesel oil or flushing oil.

If strainer (5) is damaged, replace it with a new one.

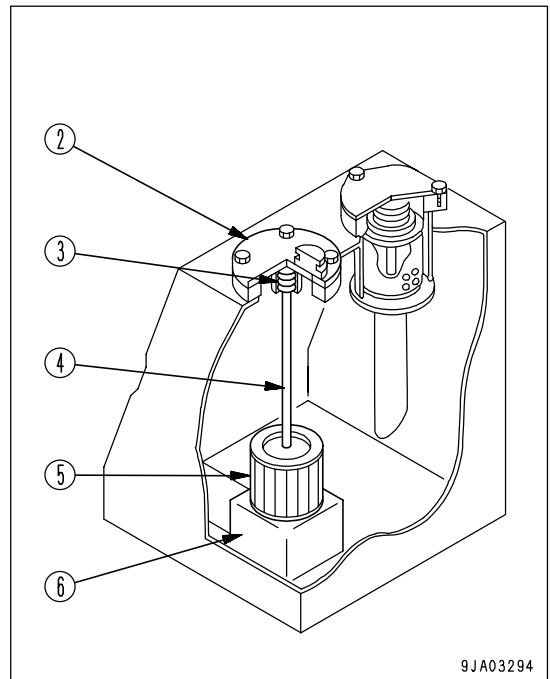
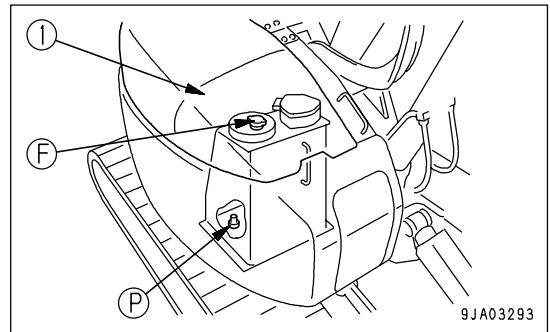
10. Refit strainer (5) by inserting it into tank projecting part (6).

11. Install cover (2) with bolts.

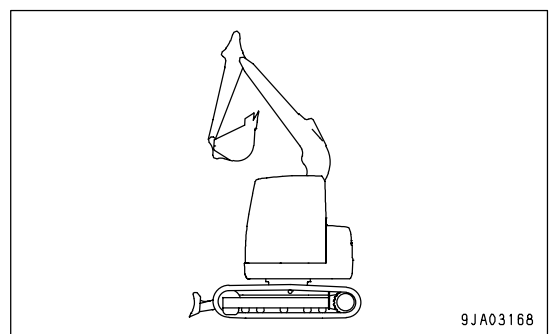
Check the O-ring installed to cover (2), and if it is damaged, replace the O-ring.

12. Add the specified amount of new and clean engine oil (for hydraulic system) through oil filler port (F). Check that the oil level is between H and L on the sight gauge.

For details of oil level check, see "Check Oil Level In Hydraulic Tank, Add Oil (PAGE 3-61)".



13. Extend the boom, arm, and bucket cylinder fully as shown in the diagram on the right, remove the oil filler cap, then install the cap and pressurize the inside of the tank.



NOTICE

Be sure to pressurize the hydraulic tank. If it is not pressurized, the pump will suck in air, and this will adversely affect the equipment.

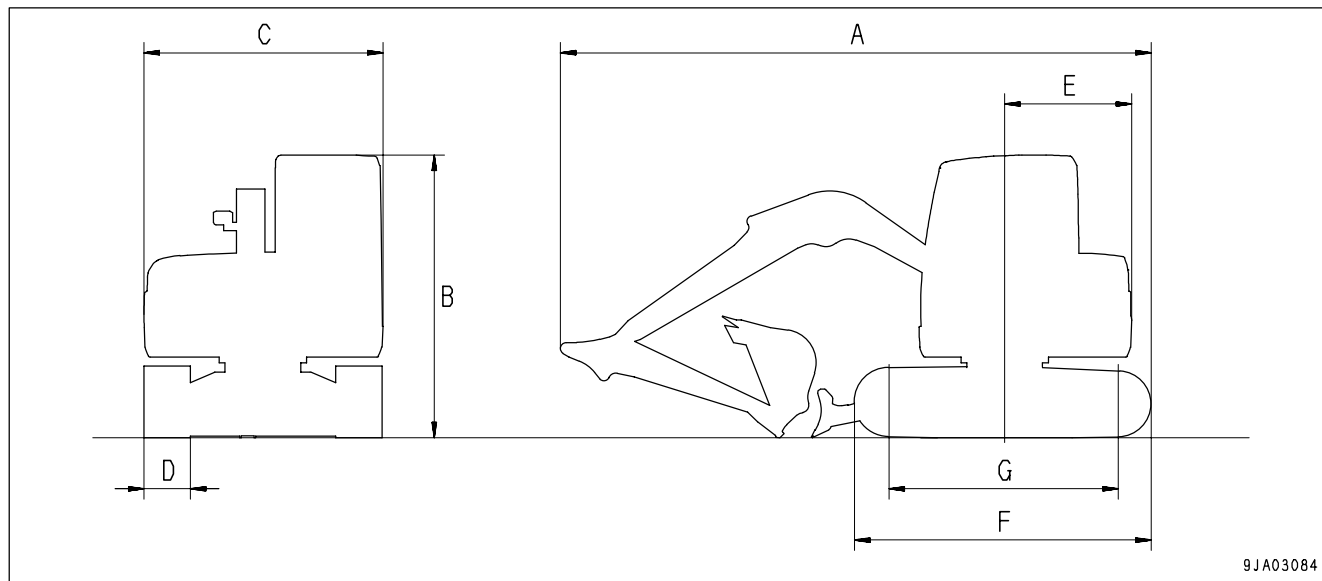
14. After replacing hydraulic oil and cleaning or replacing filter element and strainer, bleed air from the circuit.

For details of the method of bleeding the air, see "BLEEDING AIR FROM HYDRAULIC SYSTEM (PAGE 4-45)".

SPECIFICATIONS

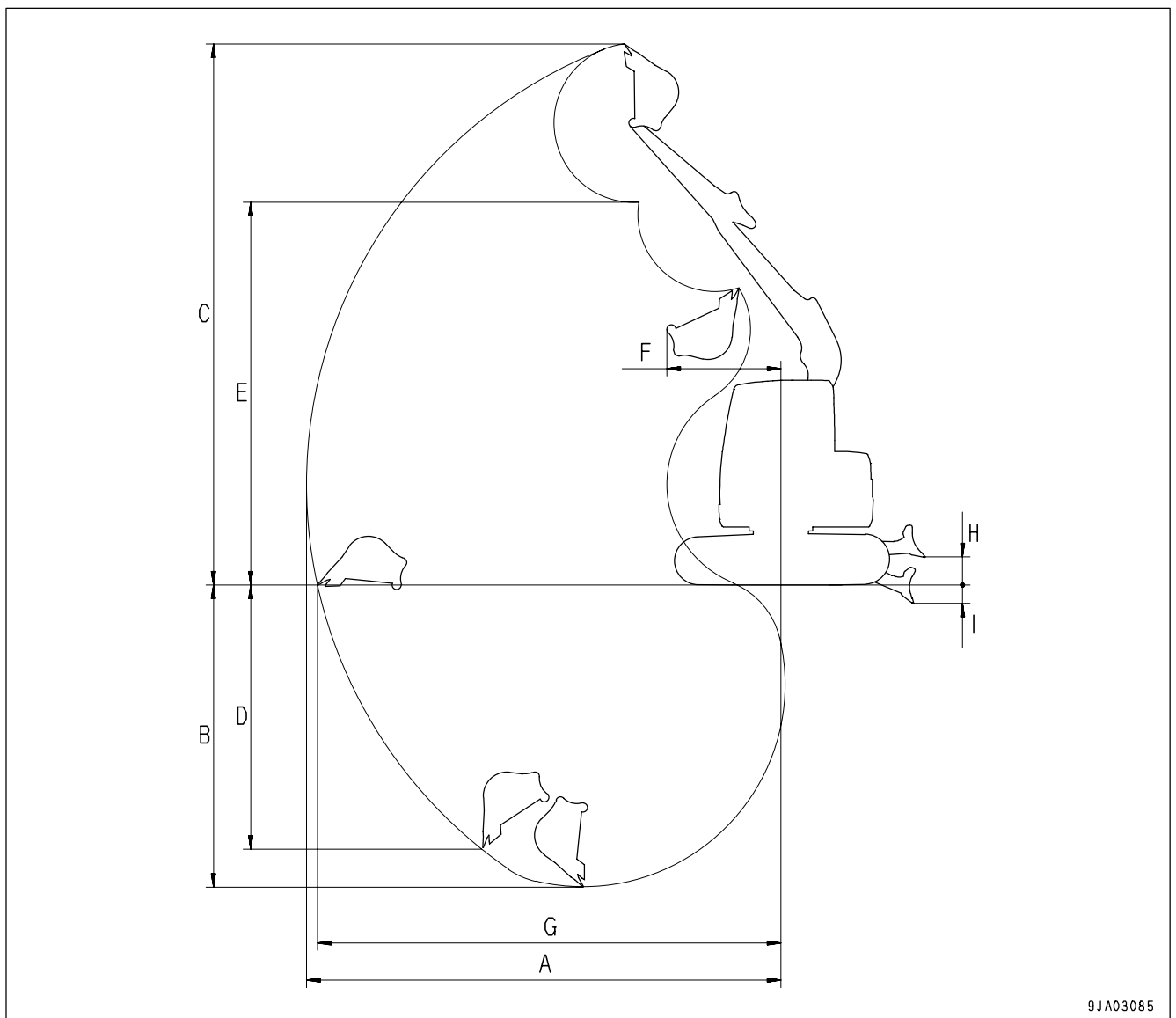
SPECIFICATIONS

Item	Unit	Steel shoe specified	Road linre speicified
Operating weight	kg (lb)	7,190 (15,854)	7,220 (15,920)
Bucket capacity	m ³ (cu/yd)	0.28 (0.37)	
Name of engine	-	Komatsu 4D95LE-3-A diesel engine	
Engine horsepower	kW (HP)/rpm	40.5 (54.0)/1,850	
A Overall length	mm (ft in)	5,770 (18' 11")	5,770 (18' 11")
B Overall height	mm (ft in)	2,730 (8' 11")	2,750 (9' 0")
C Overall width	mm (ft in)	2,330 (7' 8")	2,330 (7' 8")
D Track width	mm (ft in)	450 (1' 6")	450 (1' 6")
E Radius of upper structure	mm (ft in)	1,240 (4' 1")	1,240 (4' 1")
F Length of track	mm (ft in)	2,840 (9' 4")	2,900 (9' 6")
G Tumbler canter distance	mm (ft in)	2,235 (7' 4")	2,235 (7' 4")
Min. ground clearance	mm (ft in)	360 (1' 2")	400 (1' 4")
Travel speed (Low/High)	km/h (MPH)	3.0/4.5 (1.9/2.8)	
Continuous swing speed	rpm	10.0	



9JA03084

	Working ranges	Unit	PC78US-6
A	Max. digging reach	mm (ft in)	6,380 (20' 11")
B	Max. digging depth	mm (ft in)	4,100 (13' 5")
C	Max. digging height	mm (ft in)	7,300 (23' 11")
D	Max. vertical wall depth	mm (ft in)	3,610 (11' 10")
E	Max. dumping height	mm (ft in)	5,180 (16' 12")
F	Min. swing radius of work equipment	mm (ft in)	1,750 (5' 9")
G	Max. reach ground level	mm (ft in)	6,240 (20' 6")
H	Max. blade lifting height	mm (ft in)	380 (1' 3")
I	max. blade lowering depth	mm (ft in)	245 (10")



9JA03085

ATTACHMENTS, OPTIONS

WARNING

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

ATTACHMENTS AND OPTIONS - GENERAL INFORMATION

SAFETY FIRST

If attachments or options other than those authorized by Komatsu are installed, this will not only affect the life of the machine, but will also cause problems with safety.

When installing attachments not listed in this Operation and Maintenance Manual, contact your Komatsu distributor first.

If you do not contact Komatsu, we cannot accept any responsibility for any accidents or failures.



WARNING

General precautions

- Read the instruction manual for the attachment thoroughly, and do not use this attachment unless you are sure that you have understood the guides completely.
If you lose the instruction manual, always ask the manufacturer or your Komatsu distributors for a new copy.
- Depending on the attachment, install the necessary front guard to the machine.
- Depending on the attachment, the impact noise may make it difficult for fellow workers to transmit instructions for the operation. Before starting operation, decide a leader and determine the signals to be used.
- Do not carry out swinging operations to the side with a heavy load on the attachment. This is particularly dangerous on slopes.
- Comparing with a machine equipped with a bucket, a machine equipped with a breaker has a heavy load at the front of the work equipment and is unstable. To avoid a hazard of tipping over, do not carry out operations with the attachment swung to the side.
- When an attachment is installed, the swing range and center of gravity of the machine are different, and the machine may move in an unexpected way. Be sure that you understand the condition of the machine properly.
- Before starting operations, set up a fence around the machine to prevent people from entering.
Never operate the machine when there are people near the machine.
- To prevent serious accidents caused by misoperation, do not put your foot on the pedal except when operating the pedal.

Precautions for removal and installation operations

When removing or installing the attachments, obey the following precautions and take care to ensure safety during the operation.

- Carry out the removal and installation operation on a flat, firm ground surface.
- When the operation is carried out by two or more workers, determine the signals and follow these during the operation.
- When carrying heavy objects (more than 25kg or 55 lb), use a crane.
- When removing heavy parts, always support the part before removing it.
When lifting such as heavy parts with a crane, always pay careful attention to the position of the center of gravity.
- It is dangerous to carry out operations with the load kept suspended. Always set the load on a stand, and check that it is safe.
- When removing or installing attachments, make sure that it is in a stable condition and will not fall over.
- Never go under a load suspended from a crane.
Always stand in a position that is safe even if the load should fall.

NOTICE

Qualifications are required to operate a crane. Never allow the crane to be operated by an unqualified person.

For details of removal and installation operations, contact your Komatsu distributor.

ATTACHMENT INSTALLATION

! WARNING

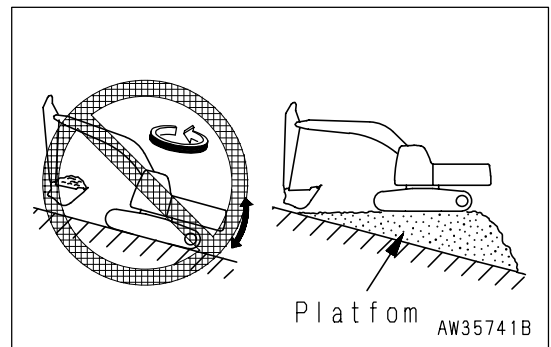
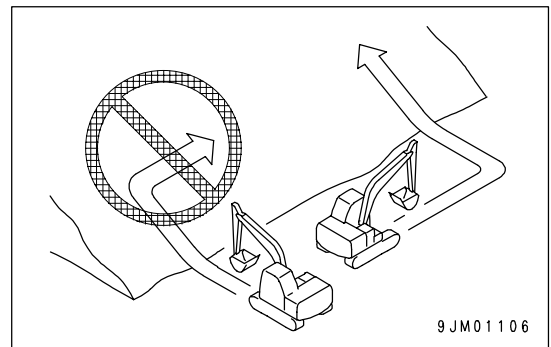
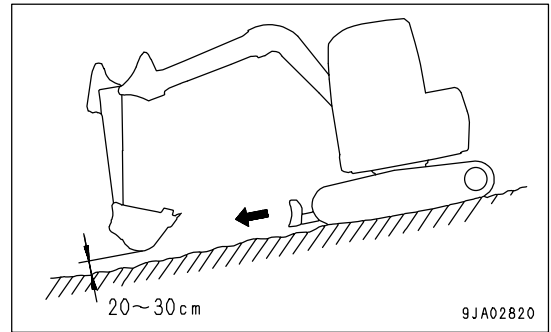
Long work equipment or heavy work equipment cause the machine to have poor stability, so there is danger of the machine losing its balance and tipping over when traveling down steep hills or when swinging on slopes. Never do any of the following. They are extremely dangerous.

- Traveling downhill with the work equipment raised
- Traveling across slopes
- Swinging upper structure on slopes
- If heavy-load work equipment is installed, there will be excessive overrun when swinging (the distance from operating to stop the swing to the point where the swing stops completely), so there is danger of mistaking the distance and hitting other objects.

Allow a margin to the stopping point when operating.

In addition, the hydraulic drift (the gradual downward movement caused by the weight of the work equipment when the work equipment is stopped in a raised condition) will also increase.

- If the correct procedure is not used when installing the boom and arm, it may lead to serious damage. Please consult your Komatsu distributor.
- When long work equipment is installed, the working range will suddenly become larger, so there is danger of mistaking the distance and hitting other objects. Allow an ample margin between the work equipment and surrounding obstacles when operating.



BUCKET WITH HOOK

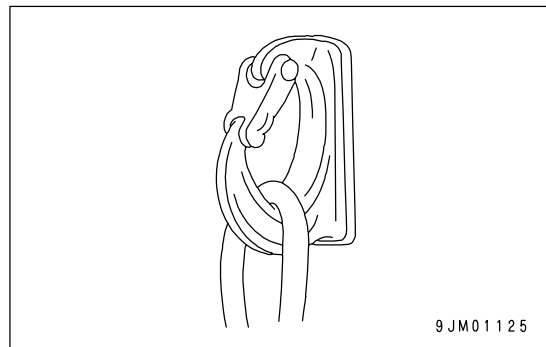
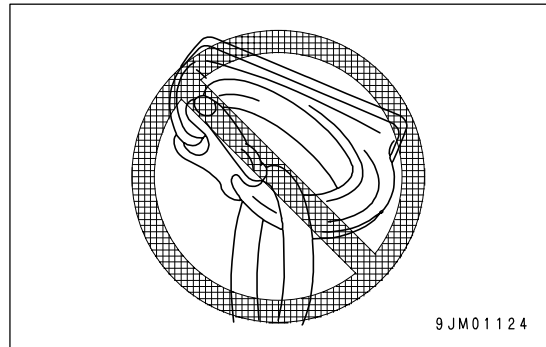
HOOK CONDITION

Check that there is no damage to the hook, stopper, or hook mount. If there is any abnormality, contact your Komatsu distributor.

PROHIBITED OPERATIONS

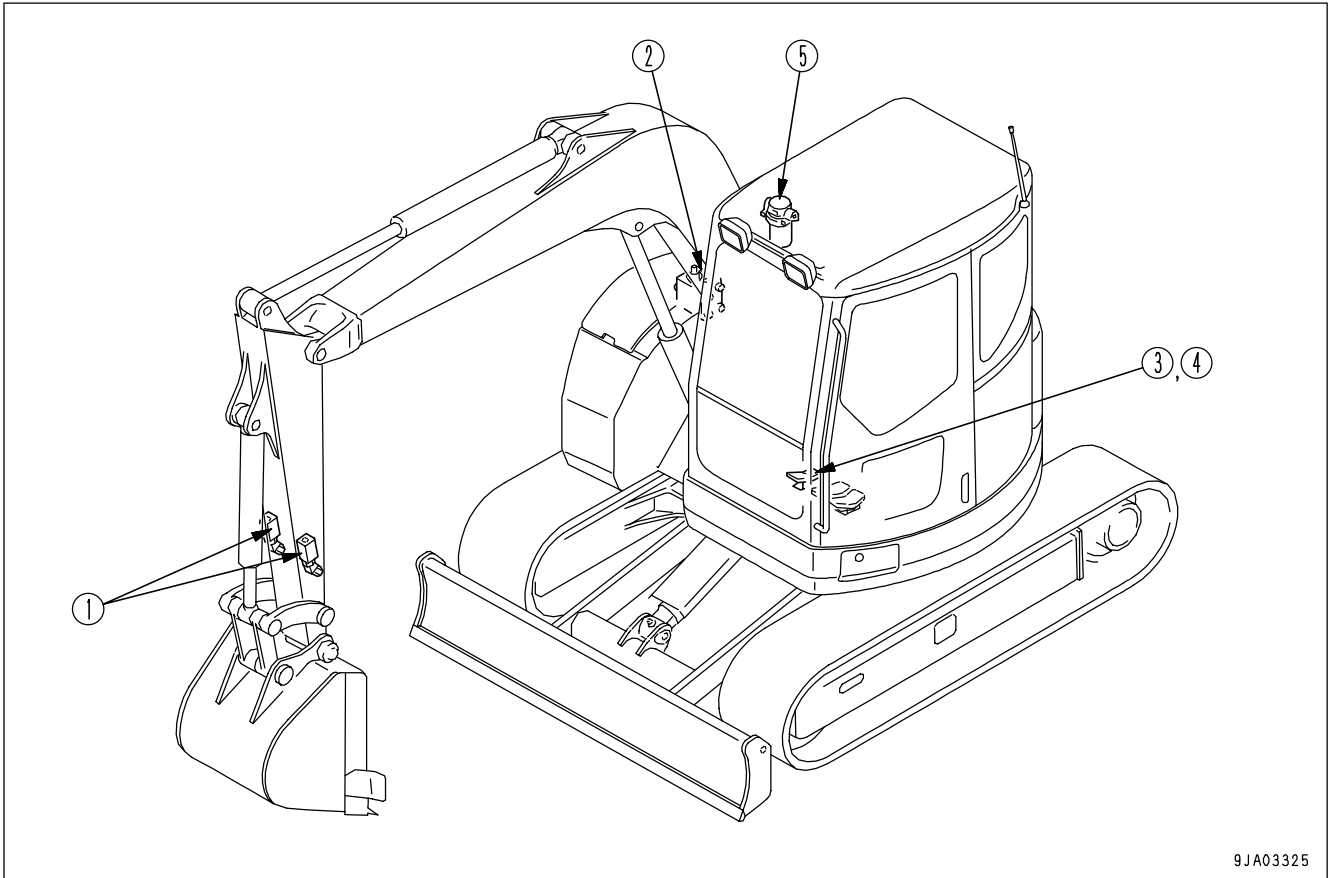
Operations with Care

- When carrying out lifting operations, reduce the engine speed and operate slowly.
- Depending on the operating posture, there is danger that the wire or ring may come off the hook. To prevent this, pay careful attention to the angle of the hook.
- Never travel the machine while lifting a load.
- If the bucket with hook is turned and used for operations, it will hit the arm during dumping operations, so be careful when using it.
- If you are planning to newly install a hook, contact your Komatsu distributor.



MACHINE READY FOR ATTACHMENT

LOCATIONS



9JA03325

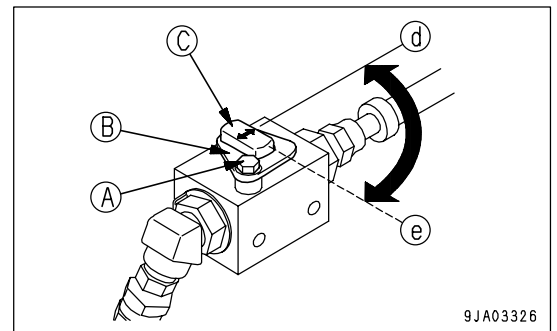
- (1) Stop valve
- (2) Selector valve
- (3) Attachment control pedal

- (4) Lock pin
- (5) Breaker circuit additional oil filter

Stop Valve

This valve (1) stops the flow of the hydraulic oil.

1. Loosen bolt (A) and then detach stopper (B).
2. Turn spool (C) to open and close the valve.
 - (d) FREE: Hydraulic oil flows.
 - (e) LOCK: Hydraulic oil stops to flow.
 Turn this valve to the LOCK position when mounting or dismantling the attachments.
3. Install stopper (B) after reversing to prevent spool (C) from turning.



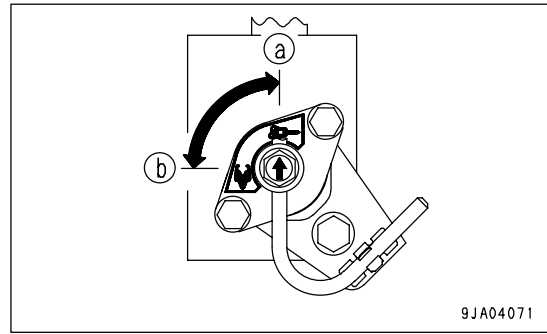
9JA03326

Selector Valve

This valve (2) switches the flow of hydraulic oil.

Position (a): When using breaker

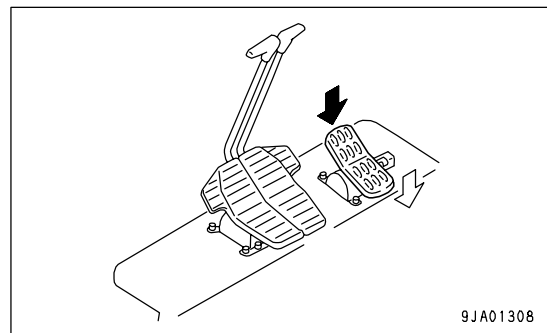
Position (b): When using general attachment (crusher, etc.)



9JA04071

Attachment Control Pedal

This pedal (3) is used to operate the attachment.



9JA01308

Lock Pin

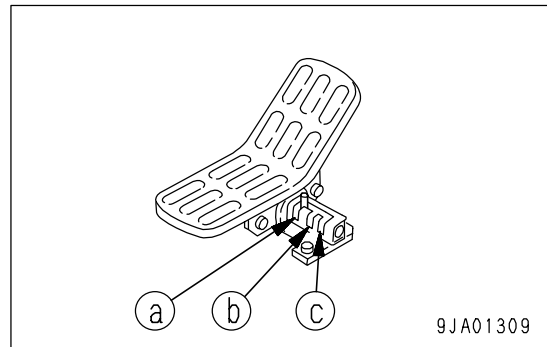
This pin (4) locks the control pedal.

Position (a): Lock

Position (b): Pedal half stroke position (When using an attachment like the slide arm requiring a small flow rate or a breaker)

Position (c): Pedal full stroke position (When using an attachment like the crusher and power ripper requiring a large flow rate)

Keep the lock pin in the LOCK position when attachment is not used.

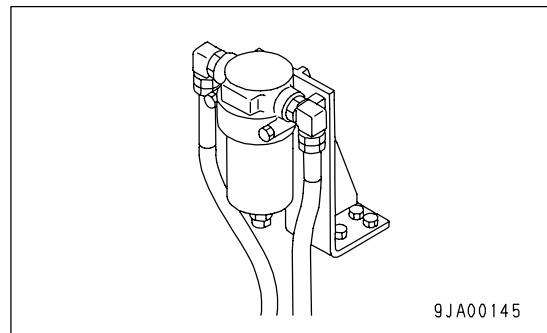


9JA01309

Breaker Circuit Additional Oil Filter

This filter (5) is used to prevent deterioration of the hydraulic oil when using the breaker.

The oil flows through this only when the selector valve is at the breaker position.



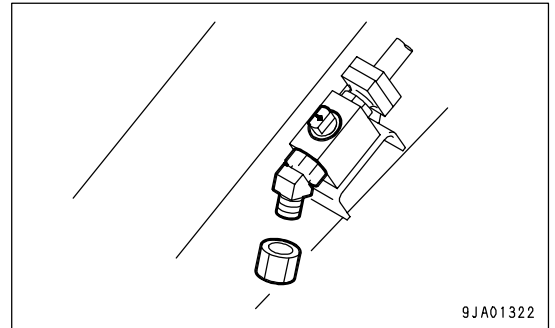
9JA00145

HYDRAULIC CIRCUIT

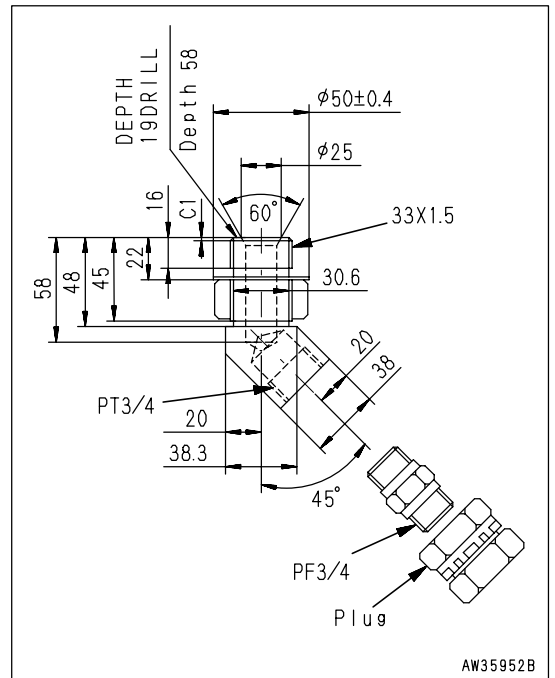
Hydraulic Circuit Connection

When connecting the attachment, connect the hydraulic circuit as follows.

1. Check that the stop valve is at the LOCK position, then remove the plug.
Be careful not to lose or damage any part that is removed.



2. Connect the piping for the attachment provided by the attachment maker.
The dimensions on the stopper valve side are as indicated at right. For those on the attachment side, confer with each manufacturer of attachment and determine.



3. After connecting the piping, bleed the air from the circuit.
 - 1) Start the engine, referring to "STARTING ENGINE (PAGE 3-72)", and run it at low idling for the subsequent 10 minutes. Then proceed to the next work.
 - 2) Run the engine at low idling until the air in the attachment circuit is completely removed, then operate the attachment pedal repeatedly (approx. 10 times) to bleed the air.

NOTICE

If the attachment maker specifies an air bleeding procedure for the attachment itself, follow the specified procedure to bleed the air.

- 3) After completing the bleeding of the air, stop the engine, and wait for at least 5 minutes before starting operations. This will release the bubbles in the oil inside the tank.
- 4) Check that there is no oil leakage, and wipe off any oil that has been spilled.

ATTACHMENT OPERATIONS



WARNING

Do not put your foot on the pedal except when operating the pedal. If rest your foot on the pedal during operations, and it is depressed by accident, the attachment may move sudden and cause serious damage or injury.

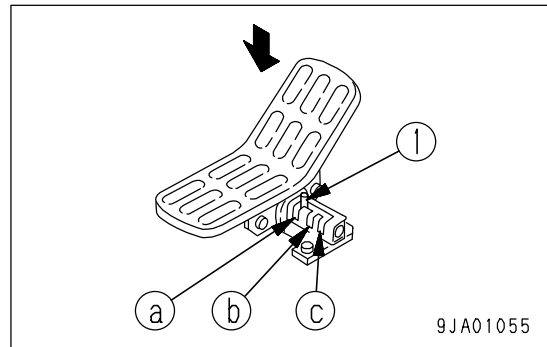
Operate the attachment as follows.

When Using Breaker

NOTICE

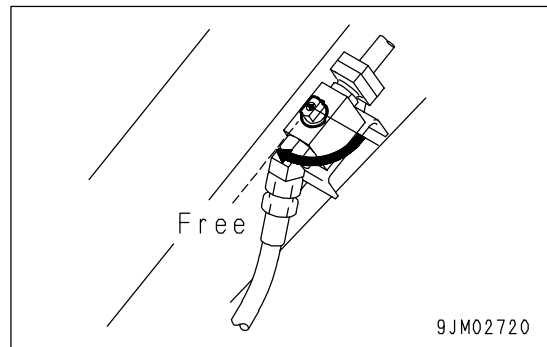
Never attempt to use the breaker with lock pin (1) set at the full stroke position (c). That will likely cause damage to the hydraulic equipment and engine overheating.

1. If the pedal is depressed forward with lock pin (1) set at the half stroke position (b), the breaker begins to work.
2. After the work is finished, return the lock pin to the LOCK position (a) to lock the pedal.

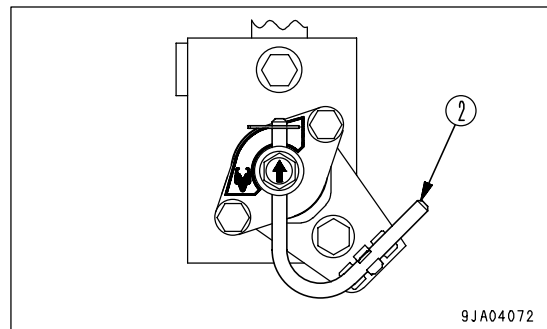


Precautions When Using

- Check that the stopper valve is in the FREE position.



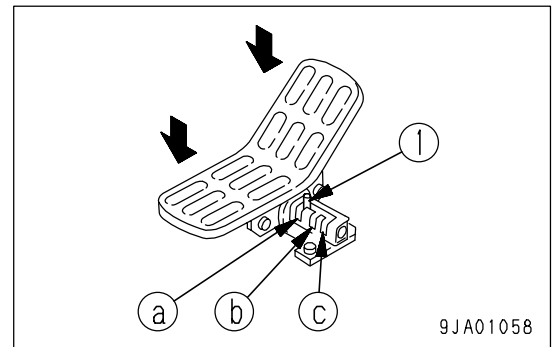
- Check that the selector valve is in the position for using the breaker.
- Check that selector valve locking bar (2) is properly installed at the position for breaker application.



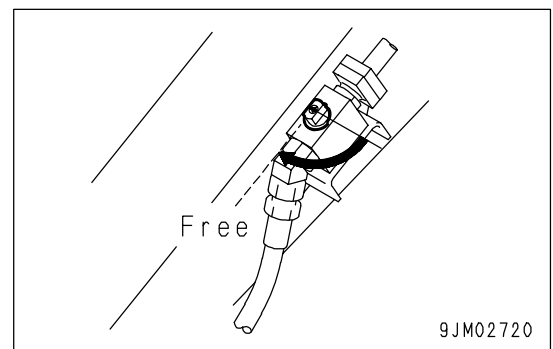
- For details of other precautions when handling the breaker, read and use correctly the instruction manual provided by the breaker manufacturer.
- When breaker is used, the hydraulic oil degrades faster than in normal operation. Shorten the maintenance interval of the hydraulic oil and filter element.
See "MAINTENANCE INTERVAL FOR HYDRAULIC BREAKER (PAGE 4-15)".

When Using General Attachment Such As Crusher

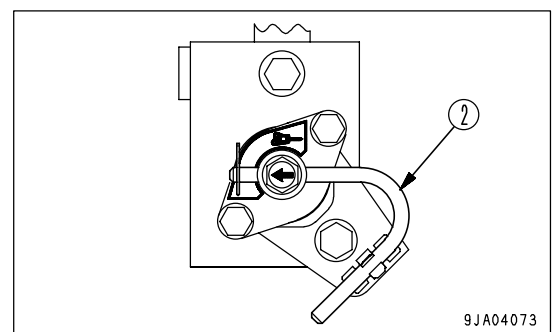
1. If the pedal is depressed with lock pin (1) set at the full stroke position (c), the attachment begins to work.
2. After the work is finished, return the lock pin to the LOCK position (a) to lock the pedal.

**Precautions When Using**

- Check that the stopper valve is in the FREE position.



- Confirm that the selector valve is set to the position for general attachments such as the crusher.
- Check that selector valve locking bar (2) is properly installed at the position for general attachment application.



- For other precautions when using the attachment, see the instruction manual provided by the attachment manufacture.

LONG TERM STORAGE

If the equipment is not to be used for a long time, do as follows.

- Set the stop valve in the LOCK condition.
- Install a plug to the valve.
Install a plug to the stopvalve.
- Set the selector valve to the position for general attachments such as the crusher.
- Set the lock pin at the LOCK position.

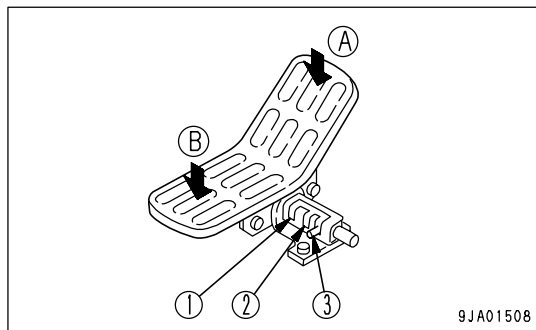
If there is no breaker or general attachment installed, operating the pedal may cause overheating and other problems.

SPECIFICATIONS

Hydraulic specifications

- Oil flow

Lock Pin position		Oil flow (liter/min)	
		A	B
(1)	Pedal lock	-	-
(2)	Half stroke	55	45
(3)	full stroke	110	90



- Low pressure safety valve Cranking pressure
When using breaker: 17.17 MPa (175 kg/cm², 2490.0 PSI)
When using other attachment: 26.51 MPa (270 kg/cm², 3830.0 PSI)

METHOD FOR REMOVING AND INSTALLING EXTRA COUNTERWEIGHT

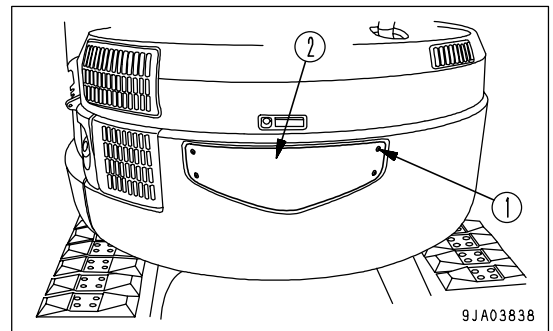
Installing Extra Counterweight



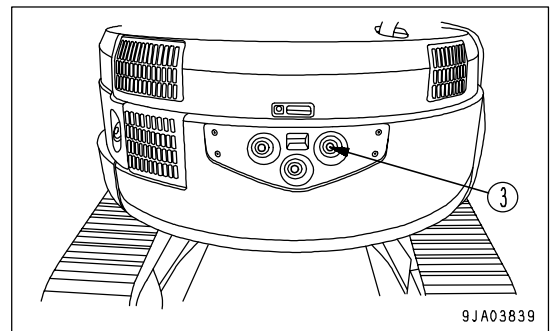
WARNING

- For lifting up this machine, use a wire rope with sufficient strength to withstand the machine weight.
- Do not attempt to lift up the machine in a posture other than explained below. Otherwise there is the danger that the lifted machine may lose a balance in the air.
- Lift up the machine, keeping it level.

1. Loosen 4 screws (1) to detach rear nameplate (2).



2. Remove 3 corks (3).



3. Using a crane, install extra counterweight (4) to the back of the standard counterweight.

REMARK

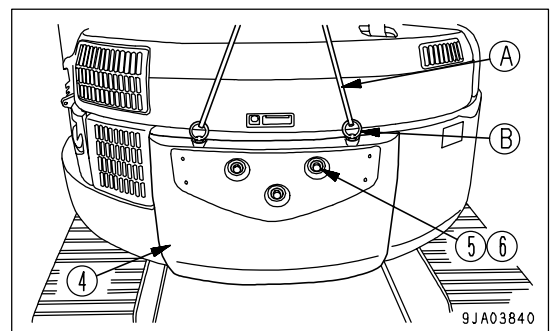
The optimum length of a wire rope for lifting should be as follows:

(A) Wire rope: Overall length 800 mm (31.5 in)

Diameter 9 mm (0.355 in)

(B) Eyebolt

Weight of extra counterweight: 220 kg (485 lb)



4. Fasten the extra counterweight with mounting bolts (5) and washers (6).

M20 bolt x 3 pieces

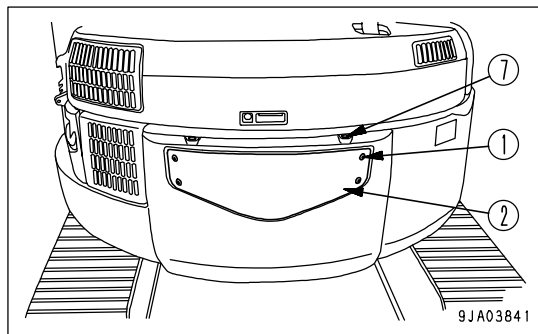
Bolt Part No.: 01010-82090

Washer Part No.: 154-30-51460

Tightening torque: 455 to 565 N·m (46.5 to 58kgf·m, 336.3 to 419.5 lbf·ft)

5. Disconnect the wire rope from the crane.

- 6. Install plastic cap (7).
- 7. Fix nameplate (2) with 4 screws (1).



CHANGING MACHINE CONTROL PATTERN (IF PATTERN CHANGE VALVE EQUIPPED)

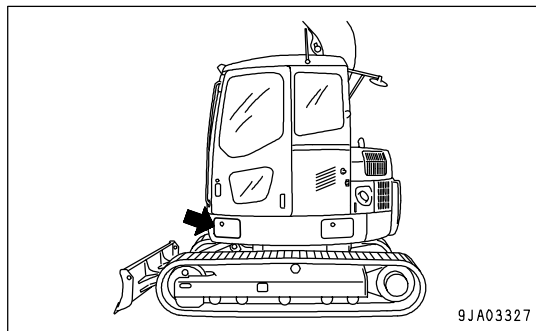


WARNING

- When changing the operating pattern of the machine, set the machine in the parking posture, stop the engine, check that the safety lock lever is at the LOCK position, then change the operating pattern.
- To prevent personal injury caused by mistaken operation, test operate the machine and check that the display on the operating pattern card is the same as the movement of the machine.
If it is not the same, replace the operating pattern card immediately with the card that matches the operating pattern.
- When checking the movement of the machine, check carefully that the surrounding area is safe, and operate slowly.

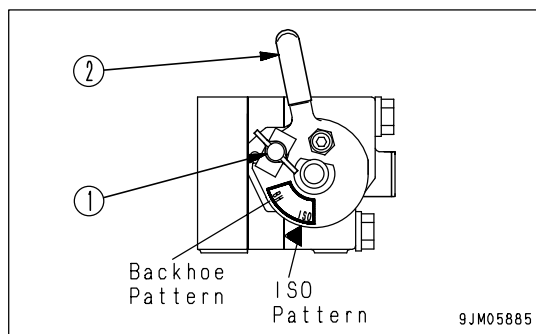
CONTROL PATTERN CHANGE PROCEDURE

1. After setting the machine in the parking posture, set the safety lock lever to the LOCK position, then stop the engine.
2. Open the inspection cover on the left side of the machine. The selector valve is inside.



3. Follow the steps explained below, when switching the patterns.

- 1) Loosen wing nut (1).
- 2) Select a new operation pattern with a notch on lever (2) and then move lever (2) downward so that the notch will match a dark triangular mark (▲) on the valve.
- 3) After the switching, tighten wing nut (1).



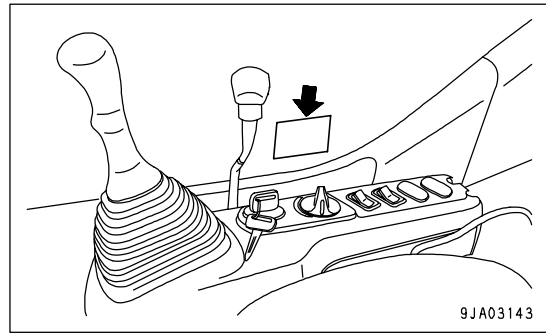
4. Change to an operating pattern card (insert it in the holder) that matches the selected operating pattern.
5. Start the engine, set the safety lock lever to the FREE position, operate the work equipment levers slowly, and check that the operating pattern has changed.

MACHINE CONTROL PATTERNS

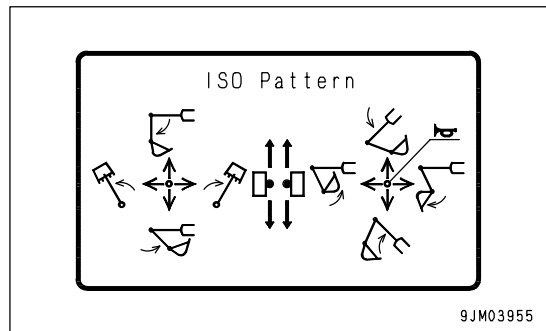


WARNING

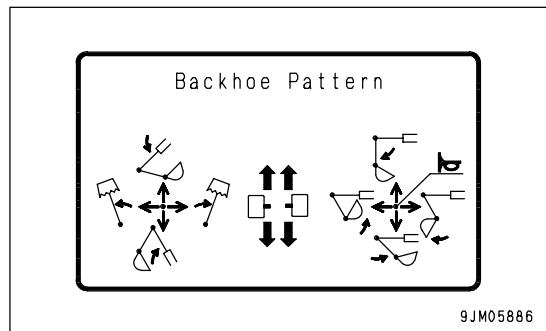
After changing the operating pattern, always change the operating pattern card in the operator's compartment.



- ISO pattern



- Backhoe pattern



ATTACHMENT GUIDE



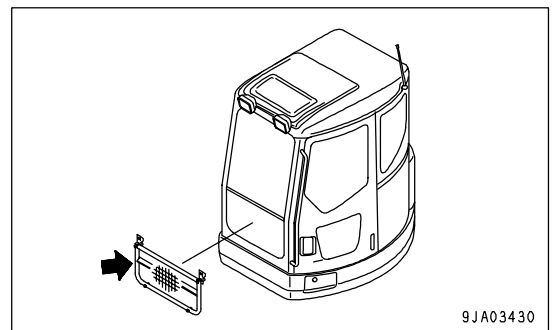
WARNING

- Please read the instruction manual for the attachment and the sections of this manual related to attachments and options.
- When installing any attachment or option, there may be problems with safety, so please contact your Komatsu distributor before installing.
- Installing attachments or options without consulting your Komatsu distributor may not only cause problems with safety, but may also have an adverse effect on the operation of the machine and the life of the equipment.
- Any injuries, accidents, or damage resulting from the use of unauthorized attachments or options will not be the responsibility of Komatsu.

OTHER ATTACHMENTS

- Front half guard

This is to protect the operator. Always use this when operating on jobsites where there is danger from rocks or sand or other flying objects. (Breaker operations, etc.)



ATTACHMENT COMBINATIONS

**WARNING**

Depending on the type or combination of work equipment, there is danger that the work equipment may hit the cab or machine body.

When using unfamiliar work equipment for the first time, check before starting if there is any danger of interference, and operate with caution.

This table lists the combination of bucket which can be installed to the standard arm and long arm.

○: Can be used

△: Can be used only for light duty work

×: Cannot be used

NOTICE

- When the long arm is equipped, if the bucket is pulled in to the machine body, the arm interferes with the body. Operate the long arm carefully.
- When the boom is fully lowered during oblique digging, the boom interferes with the undercarriage. Operate the boom carefully.

Categories of use

For general digging: Digging or loading sand, gravel, clay etc.

For light duty digging: Digging or loading dry, uncaked earth and sand, mud etc.

For loading work: Loading dry, loose earth and sand

Name	Tooth mounting pin	Capacity (m ³) SAE/CECE	Outside width (bucket body) mm (in)	Outside width (side cutter) mm (in)	Use	Standard arm	Long arm
Narrow bucket	Vertical	0.09/0.08	350 (13.8")	450 (17.7)	Narrow digging	○	○
Narrow bucket	Vertical	0.13/0.11	450 (17.7)	550 (21.7)	Narrow digging	○	○
Narrow bucket	Vertical	0.20/0.18	550 (21.7)	650 (25.6)	Narrow digging	○	○
Standard bucket	Vertical Horizontal	0.28/0.25	650 (25.6)	750 (29.6)	General digging	○	×
Light duty bucket	Vertical	0.34/0.30	760 (29.9)	-	Loading	○	×

RECOMMENDED ATTACHMENT OPERATIONS

Below described are instructions which must be followed without fail when doing the work using a hydraulic excavator equipped with an attachment.

NOTICE

Select the optimum model of attachment for a hydraulic excavator on which it is to be mounted.

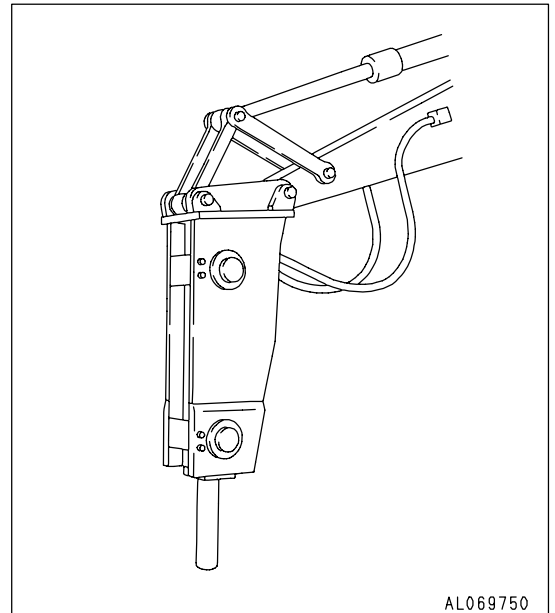
- Depending on machine models of hydraulic excavator, the kind of attachments or the model of specific attachments that can be mounted will vary. Hence, consult your Komatsu distributor for the selection of optimum attachments.

HYDRAULIC BREAKER

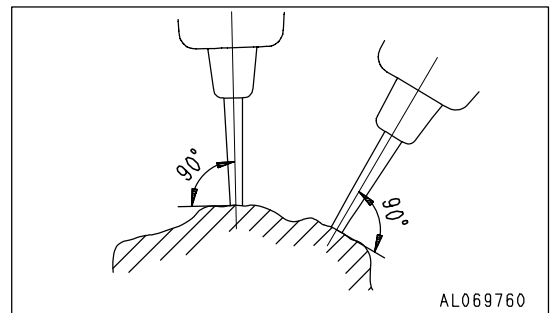
Main Applications

- Crushed rock
- Demolition work
- Road construction

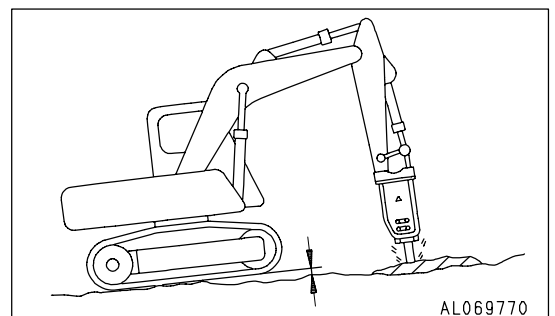
This attachment can be used for a wide range of applications including demolition of buildings, breaking up road surfaces or slag, tunnel work, rock crushing and breaking operations in quarries.



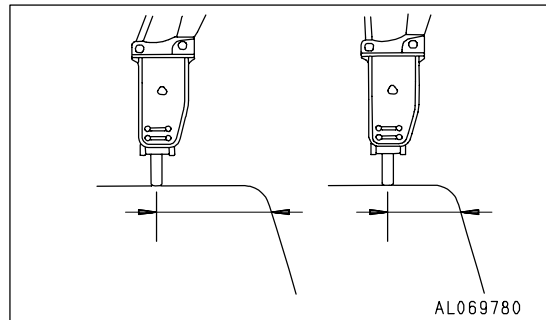
Keep the chisel pushed perpendicularly against the impact surface when carrying out breaking operations.



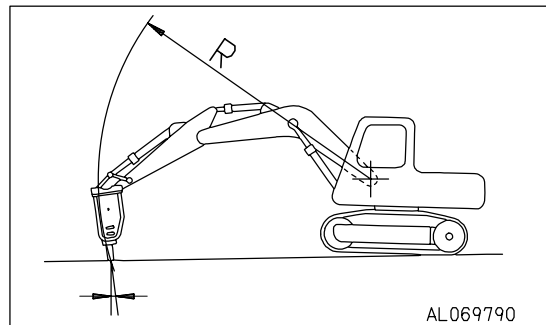
When applying impact, push the chisel against the impact surface and operate so that the chassis rises approx. 5 cm (2 in) off the ground. Do not let the machine come further off the ground than this amount.



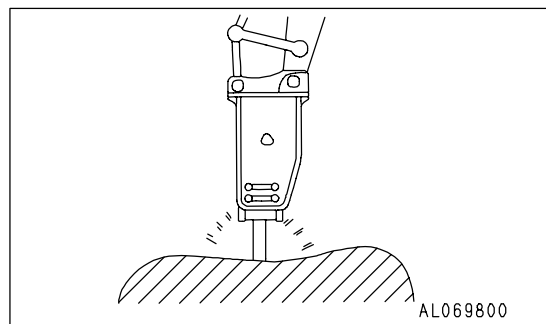
When applying continuous impact to the same impact surface, if the chisel does not penetrate or break the surface within 1 minute, change the point of impact and carry out breaking operations closer to the edge.



The direction of penetration of the chisel and the direction of the breaker body will gradually move out of line with each other, so always adjust the bucket cylinder to keep them aligned.



Always keep the chisel pressed against the impact surface properly to prevent using the impact force when there is no resistance.

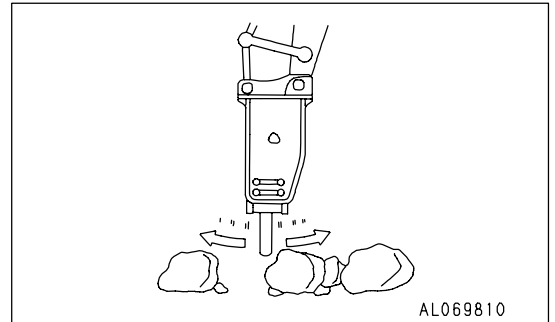


Prohibited Works

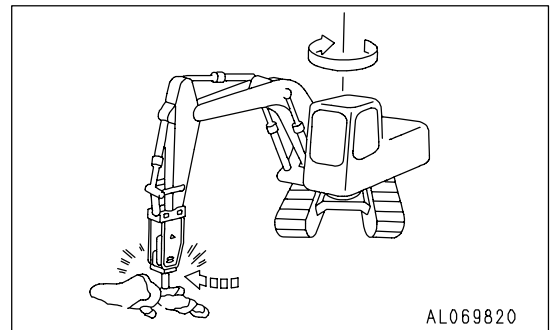
To ensure that the machine has a long life, and to ensure that operations are carried out in safety, do not operate the machine in any of the following ways.

- Do not operate all cylinders to the end of their strokes. Always leave approx. 5 cm (2 in) to spare.

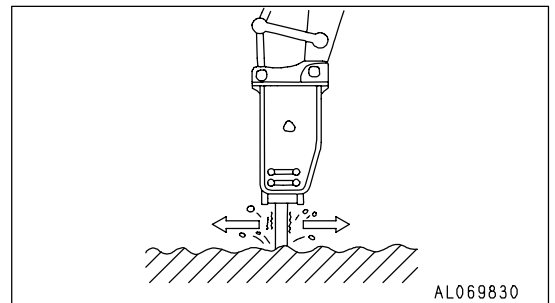
Using the mount to gather in pieces of rock



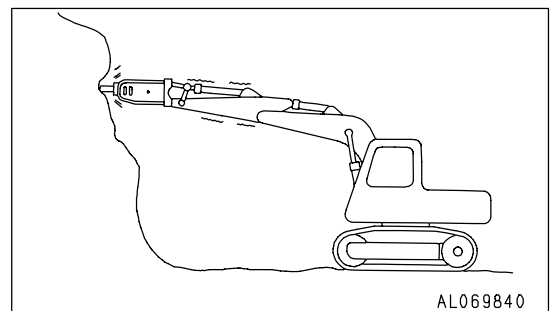
Operations using the swing force



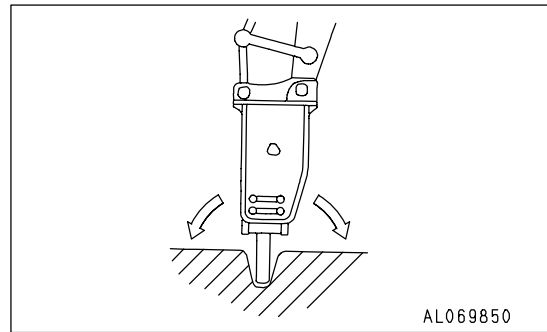
Moving the chisel while carrying out impacting operations



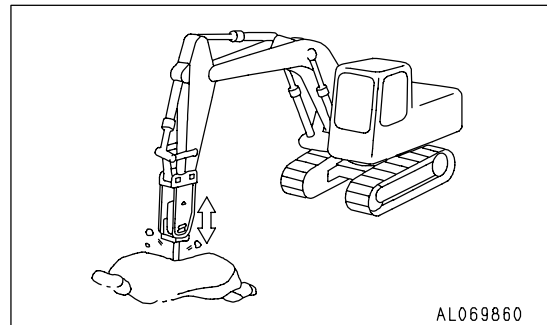
Holding the chisel horizontal or pointed up when carrying out impacting operations



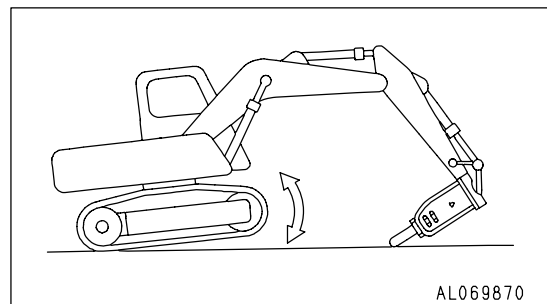
Twisting the chisel when it has penetrated the rock



Pecking operations

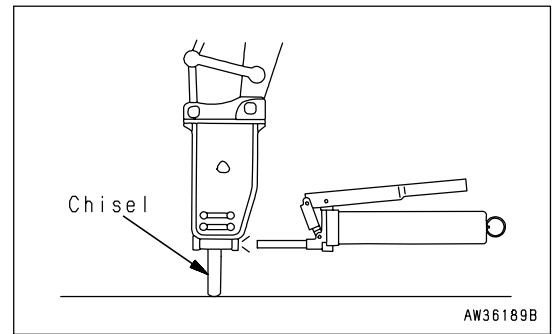


Extending the bucket cylinder fully and thrusting to raise the machine off the ground



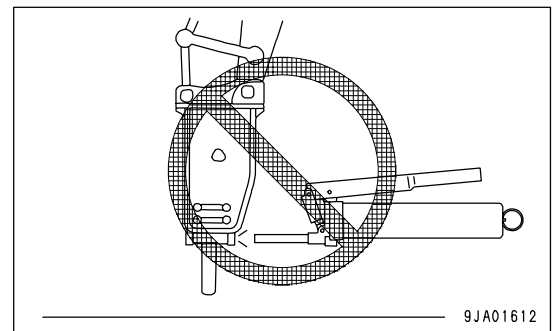
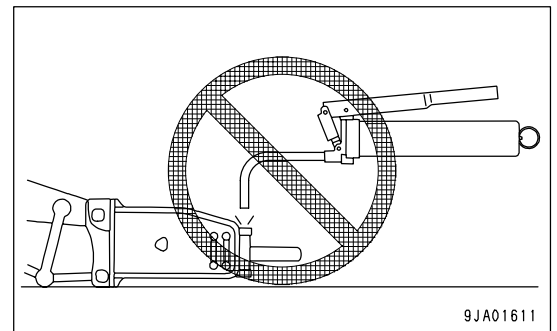
Greasing

Supply grease in the correct position.



NOTICE

If the breaker is greased in an improper posture, it is filled with more grease than necessary. As a result, soil and sand will enter the hydraulic circuit and can damage the hydraulic components, while the breaker is in use. Therefore, be sure to grease the breaker, holding it in the right posture.



INDEX

<A>					
Air Conditioner Controls	3-	43	Engine, Starting	3-	72
Ashtray	3-	54	Engine, Stopping The	3-	80
Attachment Guide	6-	15	Escape From Mud	3-	96
Attachment Combinations	6-	16			
Other Attachments	6-	15	<F>		
Attachments And Options - General			Fire Extinguisher	3-	55
Information	6-	2	Forword	1-	2
Attachment Installation	6-	3	Fuse	3-	36
Safety First	6-	2	Fusiblelink	3-	37
Auxiliary Electric Power	3-	37			
			<G>		
Battery Inspection Cover	3-	35	General Operation Information	3-	92
Bucket Replacement And Inversion	3-	99	Grease Pump Holder	3-	54
Bucket With Hook	6-	4			
Hook Condition	6-	4	<H>		
Prohibited Operations	6-	4	Handling Oil, Fuel, Coolant, And		
			Performing Oil Clinic	4-	4
			Heater and Defroster Controls	3-	38
<C>					
Cap With Lock	3-	32	<I>		
Changing Machine Control Pattern			Introduction	1-	7
(If Pattern Change Valve Equipped)	6-	13			
Control Pattern Change Procedure	6-	13	<L>		
Machine Control Patterns	6-	14	Locking	3-	102
Cold Weather Operation	3-	116	Long term storage	3-	119
After Cold Weather Season	3-	118	After Storage	3-	119
After Daily Work Completion	3-	118	Before Storage	3-	119
Cold Weather Operation Information	3-	116	During Storage	3-	119
Control Levers And Pedals	3-	20	Lubricants, Coolant And Filters	4-	4
Controllers	3-	37	Lubricants, Fuel And Coolant		
Controls And Gauges	3-	3	Specifications	4-	8
			Proper Selection	4-	8
<D>					
Detailed Controls And Gauges	3-	4	<M>		
Directions Of Machine	1-	7	Machine Inspection After Daily Work	3-	102
			Machine Operation	3-	81
<E>			Machine Operations And Controls	3-	56
Electric System Maintenance	4-	6	Machine Ready For Attachment	6-	5
Emergency Escape Hammer	3-	30	Attachment Operations	6-	8
Emission Control Information Label and Its			Hydraulic Circuit	6-	7
Location	1-	9	Locations	6-	5
Engine, After Starting	3-	77	Long term storage	6-	10
Engine, Before Starting	3-	56	Specifications	6-	10
Engine Hood	3-	33	Machine Serial No. Plate And Its Location ..	1-	8
Engine Serial No. Plate And Its Location	1-	8	Machine View Illustrations	3-	2
Engine, Check After Shut Off	3-	80	Machine, Steering The	3-	85

Maintenance Information -----	4- 2	Battery -----	2- 29
Maintenance Procedure -----	4- 16	Lifting Objects With Bucket -----	2- 32
Check Before Starting -----	4- 48	Operation -----	2- 22
Every 50 hours -----	4- 49	Starting Engine -----	2- 20
Every 100 hours -----	4- 50	Towing -----	2- 31
Every 250 hours -----	4- 51	Transportation -----	2- 28
Every 500 hours -----	4- 59	Safety Maintenance Information -----	2- 33
Every 1000 hours -----	4- 66	Service Meter Location -----	1- 9
Every 2000 hours -----	4- 70	Sliding Door -----	3- 30
Every 4000 Hours -----	4- 71	Specifications -----	5- 2
Every 5000 hours -----	4- 72	Sun Roof -----	3- 24
Initial 250 hours (First 250 hours only) ----	4- 16	Swinging -----	3- 87
When required -----	4- 17	Switches -----	3- 15
Maintenance Schedule -----	4- 14		
Maintenance Interval For Hydraulic		<T>	
Breaker -----	4- 15	Tightening Torque Specifications -----	4- 12
Maintenance Schedule Chart -----	4- 14	Tightening Torque List -----	4- 12
METHOD FOR REMOVING AND		Tool Box -----	3- 54
INSTALLING EXTRA		Transportation -----	3-108
COUNTERWEIGHT -----	6- 11	Lifting Machine -----	3-114
Monitoring System -----	3- 4	Loading And Unloading With Trailer -----	3-108
Mud Cover -----	3- 34	Transportation Procedure -----	3-108
		Traveling On Slopes -----	3- 94
<O>		Troubles And Actions -----	3-120
Road Liners and Rubber Shoes -----	3-103	Battery, Discharged -----	3-122
Operation Manual Storage -----	3- 54	How to Lower Work Equipment When	
Overall Machine View -----	3- 2	Engine Stops Due to Abnormality -----	3-127
		Other Trouble -----	3-128
<P>		Phenomena That Are Not Failures -----	3-120
Parking Machine -----	3-101	Running Out Of Fuel -----	3-120
Product Information -----	1- 8	Severe Job Condition -----	3-121
Prohibited Operations -----	3- 90	Towing The Machine -----	3-120
<R>		<W>	
Radio -----	3- 49	Wear Parts -----	4- 7
Recommended Applications -----	3- 97	Wear Parts List -----	4- 7
Recommended Attachment Operations -----	6- 17	Windshield -----	3- 25
Hydraulic Breaker -----	6- 17	Work Equipment Controls And Operations --	3- 88
		Working Mode -----	3- 89
<S>			
Safety Critical Parts -----	4- 13	<Y>	
Safety Critical Parts List -----	4- 13	Your Machine Serial Numbers And	
Safety Information -----	1- 5	Distributor -----	1- 10
Safety Information -----	2- 2		
Safety Information -----	2- 12		
Safety Labels -----	2- 4		
Location Of Safety Labels -----	2- 5		
Safety Labels -----	2- 6		
Safety Machine Operation -----	2- 20		

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