

# OPERATION MANUAL

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## MINI-CRAWLER CRANE

# MC-305C

**SERIAL NO. N00001 AND UP**

### **! WARNING**

**Unsafe use of this machine may cause serious injury or death. Operators must read this manual before operating 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**

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

# M A E D A



**Part I**  
**Introduction**

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### 1. Foreword

We thank you for selecting Maeda Mini-Crawler Crane NEOX 30C Series.

This manual is the guide book for your safe and efficient use of this machine.

This manual describes procedures for operation and service of this machine as well as matters to be strictly observed whilst performing them.

Most of accidents are attributable to operation, inspection or service where basic safety rules are neglected.

Before operating this machine, please read this manual to fully understand the method of operation, inspection and service.

Unless the content of this manual is observed, serious accident could result occur.

### **⚠ WARNING**

**Careless use of this machine may result in serious injury or death.**

**Operator and service personnel should read this manual carefully before starting operation or service of this machine.**

**This manual should be kept in a designated location as a guide, and should be referred to periodically by all the personnel involved.**

- Do not use this machine unless and until the description in this manual is totally understood.
- Always keep this manual ready and convenient for repeated reference.
- In case of loss or damage, replace it immediately by ordering from your dealer.
- Before transferring this machine, be sure to give this manual to the new owner.
- Any descriptions, values or illustrations, are based on the information at the time of publication.

Due to continued improvement on this machine, the service standards, tightening torque, pressure, measuring method, adjust value or illustration are subject to change.

Such change may effect the maintenance service work. Before starting your work, contact the supplier to obtain the latest information.

- As for the safety, see Part I Introduction 2. Safety Information as well as items contained in Part II Safety.

## 2. Safety Information

For better understanding of this manual and caution plates on the machine, safety related messages are classified as follows:

### **⚠ DANGER**

Indicates a pressing danger that may result in death or serious injury. Also indicated is the method to avoid such risk.

### **⚠ WARNING**

Indicates a type of danger which is highly probable to result in death or serious injury. Also indicated is the method to avoid such risk.

### **⚠ CAUTION**

Indicates any status where it may result in light to medium injury or serious damage to the machine. Also indicated is the method to avoid such risk.

Further, we have shown with following captions what is to be observed for the sake of the machine and what is convenient to know.

#### **OUR ADVICE**

Indicates the case where improper handling may cause damage to or shorten the useful life of the machine.

#### **NOTES** Information which is convenient to know.

Rules described in this manual in connection with procedures and safety for operation and service, are applicable only to those cases where this machine is used for designated work.

The manufacturer is not in a position to be able to presume all the cases to which this machine may be exposed by users.

Accordingly, any Rule shown in this manual or on the caution plates affixed to your machine does not cover every situation relevant to safety.

For carrying out any operation or maintenance service not described in this manual, it should be understood that necessary measures for safety are solely for the responsibility of the users.

Even for the responsibility of users, any work or operation expressly prohibited in this manual should never be performed.

### 3. Outline of the Machine

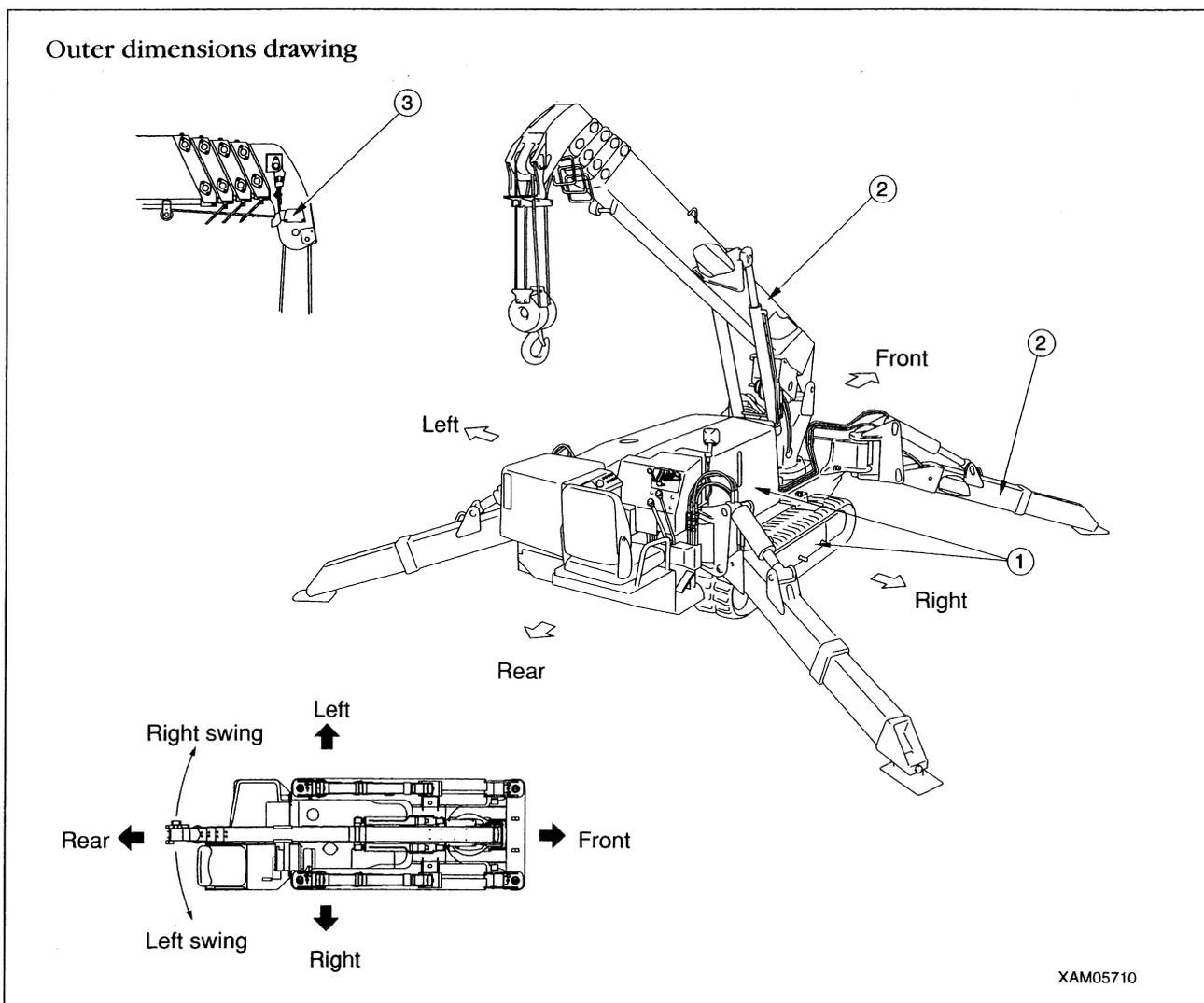
#### 3.1 Designated type of work

This machine should be used mainly for the following work:

- Crane work

This machine is a mobile crane with a boom type crane mounted on rubber tracked undercarriage. It is capable of self propelled movement on job sites and crane work within rated total load. In addition, a radio control system is provided to allow remote control of the crane.

#### 3.2 Configuration of the machine



In this manual, front and rear or right and left are defined, based on the view in travel direction (forward) while seated in its operator seat. As for the direction of boom swing, clockwise swing is called right swing and counterclockwise swing is called left swing as looked down on from the top of the machine.

This machine consists of following major components:

**[1] Undercarriage**

Consists of travel gear, engine, travel control and crane operation systems.

**[2] Crane**

Consists of boom telescoping, boom hoisting, swing and hook-block winches and outrigger systems.

**[3] Safety systems**

Provided are hook over-hoist preventive system, hydraulic safety valves and travel/outrigger/crane work selector system (Prevents their simultaneous operation).

**3.3 Functions this machine is provided with****[1] Undercarriage**

- This machine is designed to be more compact with the overall width for travelling reduced from that of our existing models, enabling it to enter tighter spaces.
- Operation with two travel levers allows pivot turn and spin turn in addition to normal operation of forward, backward travel or turning its travel direction.

**[2] Crane**

- Equipped with auto-sliding type outrigger which allows the crane to work over uneven ground or in a tight space. Outriggers can be extended in anyway to match terrain or conditions of a given job site.
- Boom telescoping, hoisting and swinging motions plus vertical move of hook block with winch operation, permits to move suspended load to desired location within rated total weight and working radius.
- Radio control system allows remote control of the outrigger setting and any crane motion.

## **4. Qualification for Operating the Machine**

### **⚠ WARNING**

- Workmen's accidents in connection with cranes are occurring frequently. What we would like our users to recognize is the fact that even persons with rich experience are incurring accidents.
- For operation of this machine, be sure to observe safety rules shown in this manual.

### **4.1 Qualification required for operating cranes**

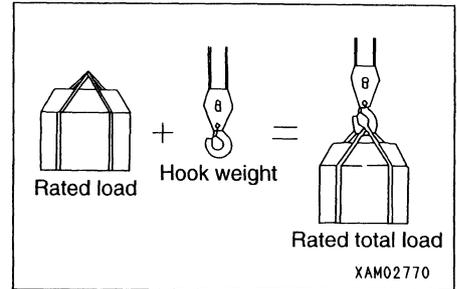
Qualification for operation of this type machine is provided in local laws and regulations. Check with the competent authority or your Meada dealer for detail.

## 5. Glossary

### 5.1 Definitions of words

#### [1] Rated total load

Means the maximum load that can be lifted in accordance with length and angle of the boom. Such load includes mass (weight) of hook and rope.

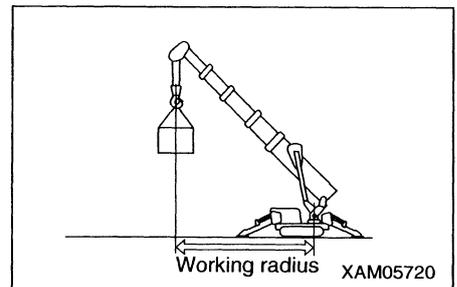


#### [2] Rated load

Means the load with the mass (weight) of hook and rope subtracted from rated total load, which is the load that can be lifted.

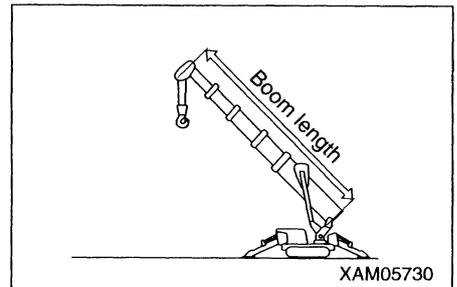
#### [3] Working radius

Means the horizontal distance from swing center to hook center.



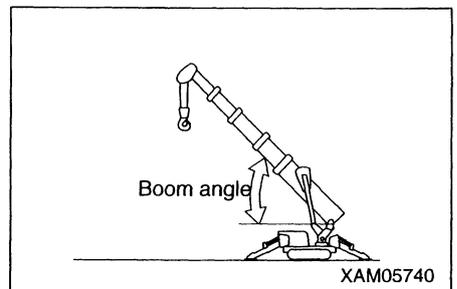
#### [4] Boom length

The distance from boom foot pin to sheave pin of top boom.



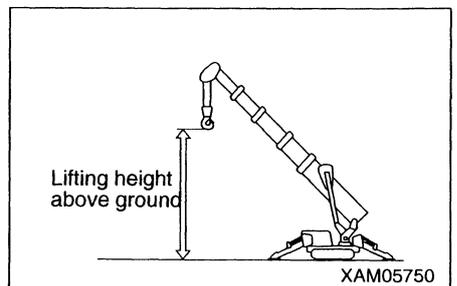
#### [5] Boom angle

The angle made between boom and horizontal ground line.



#### [6] Lifting height above ground

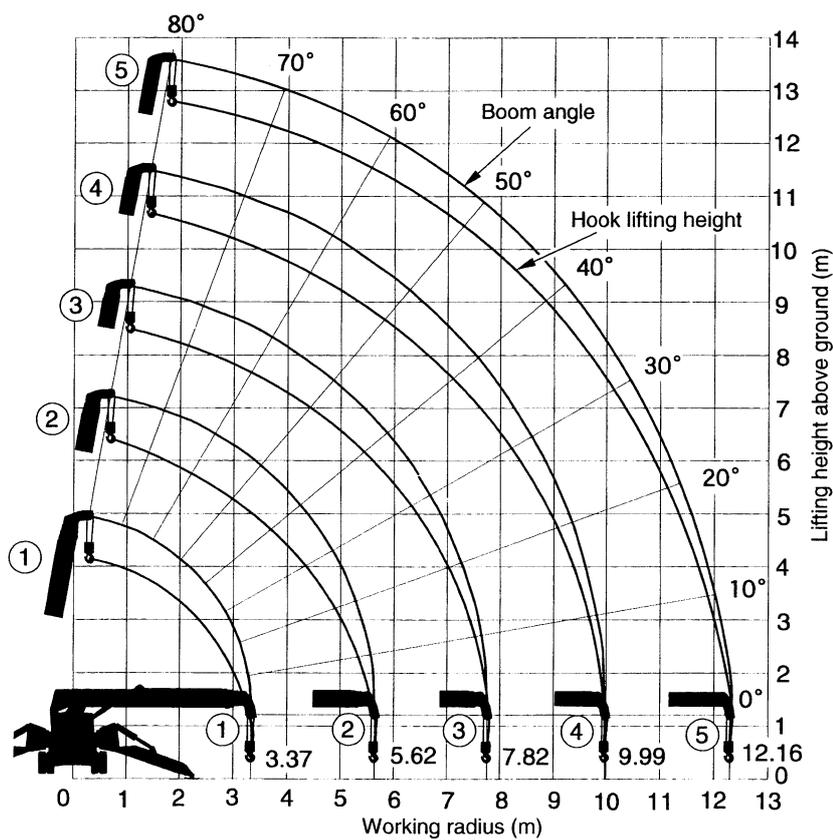
Vertical distance from hook bottom to ground with the hook lifted to the maximum (upper limit).



## 5.2 How to read working radius and lifting height diagram

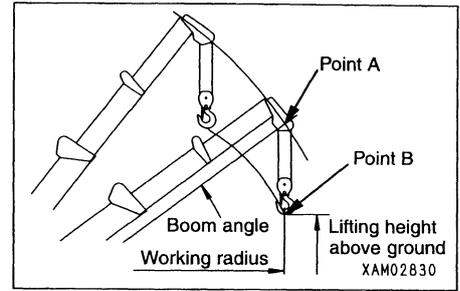
### ⚠ CAUTION

- The working radius/lifting height diagram indicates the relation between the working radius, boom angle and lifting height above ground of this machine, without any load suspended.
- ④ in the working radius/lifting height diagram shows the status where one half of  mark is extended from the third stage boom.



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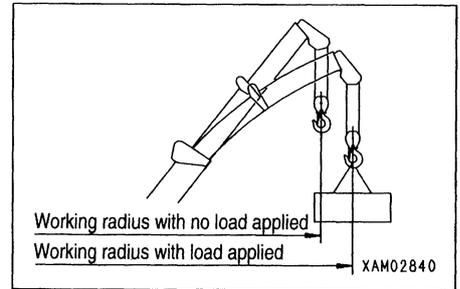
1. Point A in the sketch to the right represents boom angle while point B represents the lifting height above ground. Working radius at points A and B are the same.



2. "Working radius/Lifting height Diagram" is based on "no-load" without taking into consideration any bending of the boom.

In actuality, when load is lifted, the boom will bend causing the working radius to slightly expand.

When working radius expands, the value of rated total load will be reduced. It is important that you set your working plan with some room added to the Diagram.



## 5.3 How to read total rated load chart

### **⚠ CAUTION**

- Rated total load chart is based on level, hard ground. Depending on the outrigger setting or ground conditions, machine may tip over.
- Rated total load chart is based on working radius with bending of boom and lifted load taken into consideration.
- If boom ③ is extended to any extent, work should be performed within the capacity for “Booms ①+②+③”.
- If boom ④ is extended to any extent, work should be performed within the capacity for “Booms ①+②+③+④”.
- If one half or more of the mark  is exposed from boom ③, work should be performed within capacity for “Booms ①+②+③+④+⑤”.
- If working radius exceeds the value of Working Radius column in the chart by any extent, work should be performed within the rated total load in the next column of Working Radius.
- Rated total load is shown with the mass of hook (30kg) included.
- Unless outrigger is extended to maximum, work should be performed in accordance with the “Rated Total Load Chart without extending outrigger to maximum”.

MC-305C Rated Total Load Chart

| With Outrigger Extended to Maximum |  |  |  |                |  |      |  |      |  | With Outrigger Extended to Midway |  |      |  |      |  |                       |  |   |  | With Outrigger Extended to Minimum |  |                |  |      |  |      |  |      |  |                       |  |                |  |   |  |      |  |       |  |                |  |      |  |      |  |      |  |      |  |      |  |      |  |      |  |       |  |     |  |     |  |
|------------------------------------|--|--|--|----------------|--|------|--|------|--|-----------------------------------|--|------|--|------|--|-----------------------|--|---|--|------------------------------------|--|----------------|--|------|--|------|--|------|--|-----------------------|--|----------------|--|---|--|------|--|-------|--|----------------|--|------|--|------|--|------|--|------|--|------|--|------|--|------|--|-------|--|-----|--|-----|--|
| Boom ① and Boom ①+②                |  | 2.5 or shorter   |  | 3.0            |  | 3.5  |  | 4.0  |  | 4.5                               |  | 5.0  |  | 5.62 |  | 2.5 or shorter        |  | 3.0   |  | 3.5                                |  | 4.0            |  | 4.5  |  | 5.0  |  | 5.62 |  | Boom ① and Boom ①+②   |  | 2.5 or shorter |  | 3.0   |  | 3.5  |  | 4.0   |  | 4.5            |  | 5.0  |  | 5.62 |  |      |  |      |  |      |  |      |  |      |  |       |  |     |  |     |  |
| Working Radius (m)                 |  | 2930   |  | 2350           |  | 1950 |  | 1670 |  | 1380                              |  | 1140 |  | 950  |  | Working Radius (m)    |  | 2930  |  | 2350                               |  | 1950           |  | 1670 |  | 1380 |  | 1140 |  | Working Radius (m)    |  | 2930           |  | 2350  |  | 1950 |  | 1670  |  | 1380           |  | 1140 |  | 950  |  |      |  |      |  |      |  |      |  |      |  |       |  |     |  |     |  |
| Rated total load (kg)              |  | 2930   |  | 2350           |  | 1950 |  | 1670 |  | 1380                              |  | 1140 |  | 950  |  | Rated total load (kg) |  | 2930  |  | 2350                               |  | 1950           |  | 1670 |  | 1380 |  | 1140 |  | Rated total load (kg) |  | 2930           |  | 2350  |  | 1950 |  | 1670  |  | 1380           |  | 1140 |  | 950  |  |      |  |      |  |      |  |      |  |      |  |       |  |     |  |     |  |
| Boom ①+②+③                         |  | When boom ③ is extended to any extent, work should be carried out based on the performance of Boom ①+②+③.                      |  | 2.7            |  | 3.0  |  | 3.5  |  | 4.0                               |  | 4.5  |  | 5.0  |  | 5.62                  |  | When boom ③ is extended to any extent, work should be carried out based on the performance of Boom ①+②+③. |  | 2.7                                |  | 3.0            |  | 3.5  |  | 4.0  |  | 4.5  |  | 5.0                   |  | 5.62           |  | When boom ③ is extended to any extent, work should be carried out based on the performance of Boom ①+②+③. |  | 2.7  |  | 3.0   |  | 3.5            |  | 4.0  |  | 4.5  |  | 5.0  |  | 5.62 |  |      |  |      |  |      |  |       |  |     |  |     |  |
| Working Radius (m)                 |  | 2270   |  | 2090           |  | 1680 |  | 1415 |  | 1230                              |  | 1070 |  | 945  |  | 790                   |  | 610   |  | 520                                |  | 2270           |  | 2090 |  | 1680 |  | 1415 |  | 1230                  |  | 1070           |  | 945   |  | 790  |  | 610   |  | 520            |  | 2270 |  | 2090 |  | 1680 |  | 1415 |  | 1230 |  | 1070 |  | 945  |  | 790   |  | 610 |  | 520 |  |
| Rated total load (kg)              |  | 2270   |  | 2090           |  | 1680 |  | 1415 |  | 1230                              |  | 1070 |  | 945  |  | 790                   |  | 610   |  | 520                                |  | 2270           |  | 2090 |  | 1680 |  | 1415 |  | 1230                  |  | 1070           |  | 945   |  | 790  |  | 610   |  | 520            |  | 2270 |  | 2090 |  | 1680 |  | 1415 |  | 1230 |  | 1070 |  | 945  |  | 790   |  | 610 |  | 520 |  |
| Boom ①+②+③+④                       |  | When boom ④ is extended to any extent, work should be carried out based on the performance of Boom ①+②+③+④.                    |  | 4.0            |  | 4.5  |  | 5.0  |  | 6.0                               |  | 7.0  |  | 8.0  |  | 9.0                   |  | 9.99  |  | 4.0                                |  | 4.5            |  | 5.0  |  | 6.0  |  | 7.0  |  | 8.0                   |  | 9.0            |  | 9.99  |  | 4.0  |  | 4.5   |  | 5.0            |  | 6.0  |  | 7.0  |  | 8.0  |  | 9.0  |  | 9.99 |  |      |  |      |  |       |  |     |  |     |  |
| Working Radius (m)                 |  | 1060   |  | 950            |  | 860  |  | 750  |  | 630                               |  | 490  |  | 410  |  | 350                   |  | 1060  |  | 950                                |  | 860            |  | 750  |  | 630  |  | 490  |  | 410                   |  | 350            |  | 1060  |  | 950  |  | 860   |  | 750            |  | 630  |  | 490  |  | 410  |  | 350  |  |      |  |      |  |      |  |       |  |     |  |     |  |
| Rated total load (kg)              |  | 1060   |  | 950            |  | 860  |  | 750  |  | 630                               |  | 490  |  | 410  |  | 350                   |  | 1060  |  | 950                                |  | 860            |  | 750  |  | 630  |  | 490  |  | 410                   |  | 350            |  | 1060  |  | 950  |  | 860   |  | 750            |  | 630  |  | 490  |  | 410  |  | 350  |  |      |  |      |  |      |  |       |  |     |  |     |  |
| Boom ①+②+③+④+⑤                     |  | When more than one-half of mark is exposed from boom ④, work should be carried out based on the performance of Boom ①+②+③+④+⑤. |  | 4.5 or shorter |  | 5.0  |  | 6.0  |  | 7.0                               |  | 8.0  |  | 9.0  |  | 10.0                  |  | 11.0  |  | 12.16                              |  | 4.5 or shorter |  | 5.0  |  | 6.0  |  | 7.0  |  | 8.0                   |  | 9.0            |  | 10.0  |  | 11.0 |  | 12.16 |  | 4.5 or shorter |  | 5.0  |  | 6.0  |  | 7.0  |  | 8.0  |  | 9.0  |  | 10.0 |  | 11.0 |  | 12.16 |  |     |  |     |  |
| Working Radius (m)                 |  | 775  |  | 640            |  | 495  |  | 410  |  | 360                               |  | 320  |  | 290  |  | 260                   |  | 250   |  | 775                                |  | 640            |  | 495  |  | 410  |  | 360  |  | 320                   |  | 290            |  | 260   |  | 250  |  | 775   |  | 640            |  | 495  |  | 410  |  | 360  |  | 320  |  | 290  |  | 260  |  | 250  |  |       |  |     |  |     |  |
| Rated total load (kg)              |  | 775  |  | 640            |  | 495  |  | 410  |  | 360                               |  | 320  |  | 290  |  | 260                   |  | 250   |  | 775                                |  | 640            |  | 495  |  | 410  |  | 360  |  | 320                   |  | 290            |  | 260   |  | 250  |  | 775   |  | 640            |  | 495  |  | 410  |  | 360  |  | 320  |  | 290  |  | 260  |  | 250  |  |       |  |     |  |     |  |

Notes

1. The Rated Total Load Chart indicates the value for work on level, hard ground. Sufficient attention should be paid for because, depending on the ground conditions where outrigger is placed, the crane can tip over.
2. The Rated Total Load Chart is based on actual working radius which includes bend of boom due to lifting load. Rough operation is extremely dangerous even if you are working within the rated total load. Learn to always perform safe operation.
3. Depending on extension and placement of outrigger, crane could tip over even by lifting a rated total load. Be always alert.
4. Rated total load shown includes the weight of hook block (30kg).

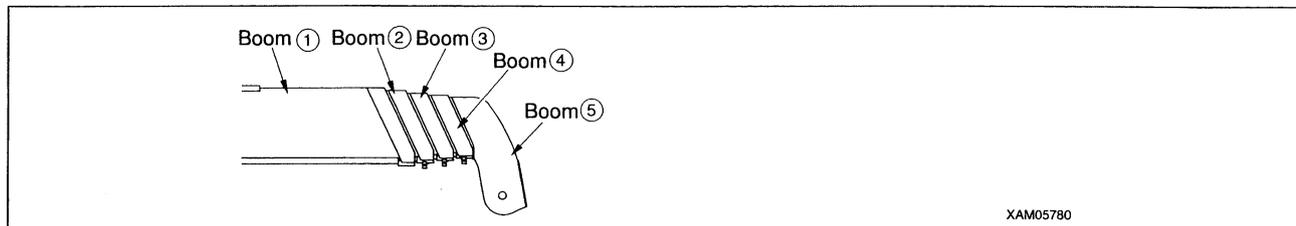
# I INTRODUCTION

Rated Total Load Chart shows the maximum load the crane is capable of lifting by the working radius, in accordance with boom length and outrigger setting.

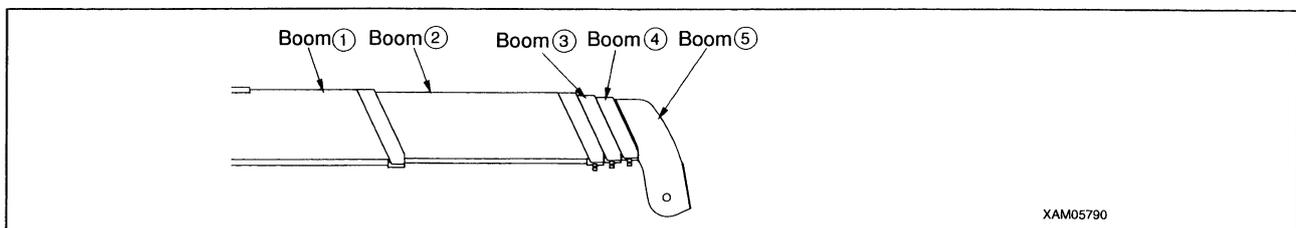
## [1] Boom length

“Boom ① and Boom ①+②, Boom ①+②+③, Boom ①+②+③+④ and Boom ①+②+③+④+⑤” as appear on top horizontal column of the Rated Total Load Chart represent following cases:

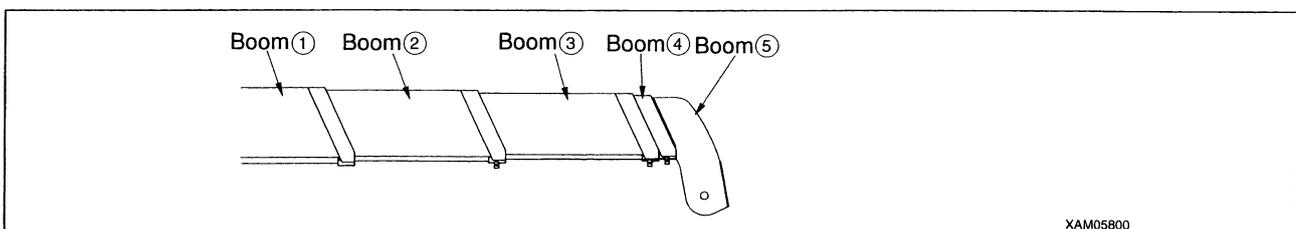
1. Boom ① : Booms ② thru ⑤ are all retracted.



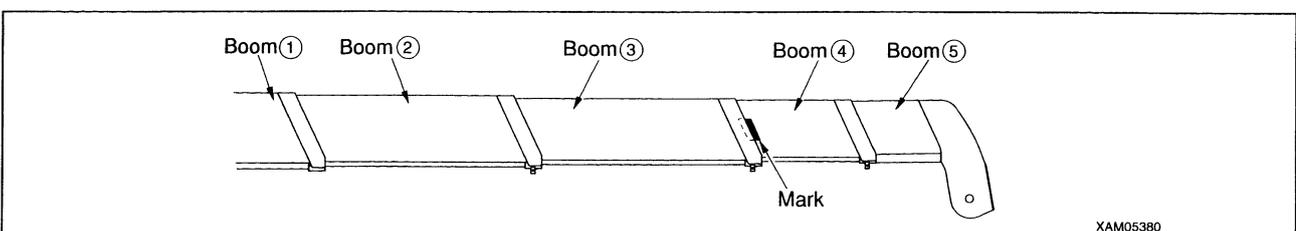
2. Boom ①+②: With Boom ② extended fully, remainder of booms are all retracted. If Boom ② is extended to any extent, work should be carried out on the basis of performance for this configuration.



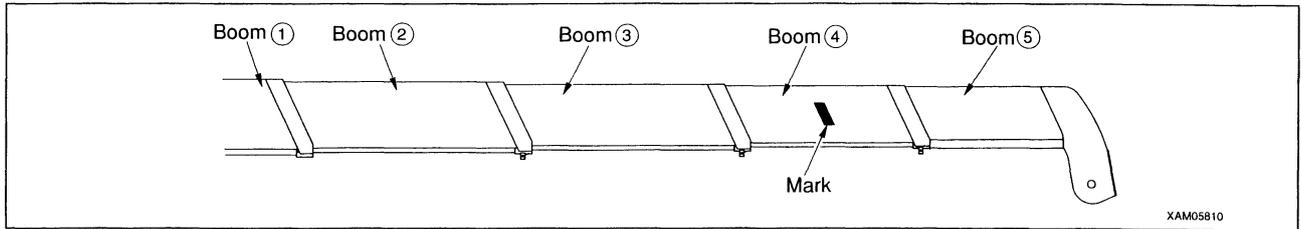
3. Boom ①+②+③ : With Booms ② and ③ extended fully, Booms ④ and ⑤ are retracted. In case Boom ③ is extended to any extent, work should be carried out on the basis of performance for this configuration.



4. Boom ①+②+③+④ : With booms ② and ③ extended fully, both booms ④ and ⑤ are extended to midway (One-half of mark  on boom ④ is exposed out of boom ③). When booms ④ and ⑤ are extended to any extent also, work should be carried out based on the performance for this configuration.



5. Boom ①+②+③+④+⑤ : All the booms are extended fully. When one-half or more of mark  on boom ④ is extended also, work should be carried out on the basis of performance for this configuration.



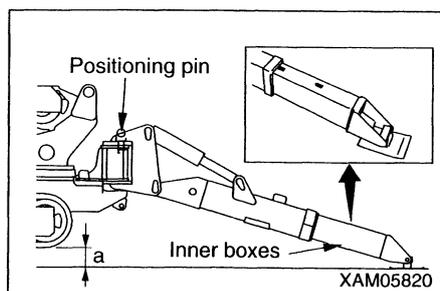
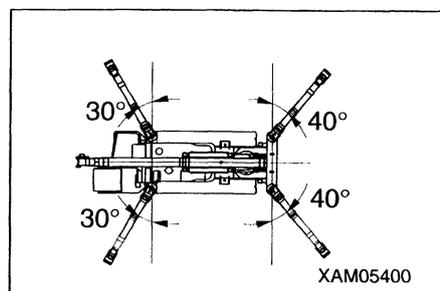
## [2] Outriggers extended to the maximum

### ⚠ WARNING

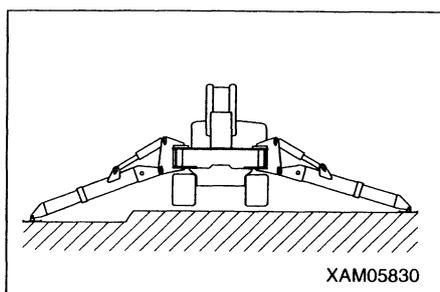
- For crane work, be sure to extend all the outriggers. Never perform any crane work without setting up outrigger. Machine may tip over causing serious injury otherwise.
- Outriggers should be extended while watching leveling instrument so that the machine is set horizontally.
- For working without extending outrigger to maximum, see the values in 「Rated Total Load Chart without extending outrigger to maximum」  
Working under improper value may cause the machine to tip over.
- Swinging 360 degrees with a load lifted may expose the machine to an unstable position. Reduce the working radius and use sufficient care.

“Outriggers extended to the maximum” at the top of Rated Total Load Chart indicates the status shown in the sketch to the right.

★ This “Outrigger Extended to Maximum” means that outrigger grounding angle is set to pin positions (40 degrees front and 30 degrees rear), inner boxes of all the outriggers are extended to maximum, all the outriggers are set on level ground and dimension a in the sketch to the right is about 50mm (distance between bottom of outrigger and bottom of track).



★ If, even with all the outriggers extended to maximum, dimension a for any outrigger is greater than 50mm due to ground contour, length of outrigger extension can become smaller. Under such circumstances, follow the column “With Outrigger Extended to Midway” in the Rated Total Load and proceed with your work.



## [3] Outriggers extended to midway

**⚠ WARNING**

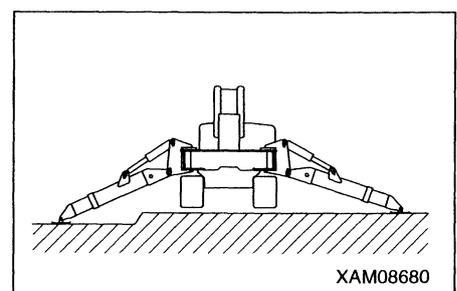
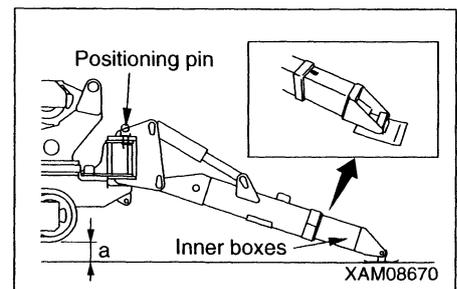
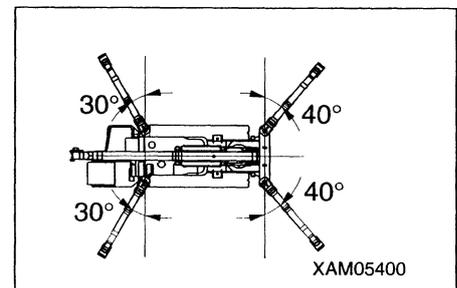
- For crane work, be sure to extend all the outriggers. Never perform any crane work without setting up outrigger. Machine may tip over causing serious injury otherwise.
- Outriggers should be extended while watching leveling instrument so that the machine is set horizontally.
- For working without extending outrigger to maximum, see the values in “Rated Total Load Chart without extending outrigger to maximum” Working under improper value may cause the machine to tip over.
- Swinging 360 degrees with a load lifted may expose the machine to an unstable position. Reduce the working radius and use sufficient care.

“Outrigger extended to the maximum” at the top of Rated Total Load Chart indicates the status shown in the sketch to the right.

★ This “Outrigger Extended to Maximum” means that outrigger grounding angle is set to pin positions (40 degrees front and 30 degrees rear), inner boxes of all the outriggers are extended to maximum, all the outriggers are set on level ground and dimension a in the sketch to the right is about 50mm (distance between bottom of outrigger and bottom of track).

★ Even if one outrigger is retracted to its “midway” position from full extension, work should be performed under the “Outrigger Extended to midway” configuration.

★ If, even with all the outriggers extended to maximum, dimension a for any outrigger is greater than 50mm due to ground contour, length of outrigger extension can become smaller. Under such circumstances, follow the column “With Outrigger Extended to Midway” in the Rated Total Load and proceed with your work.



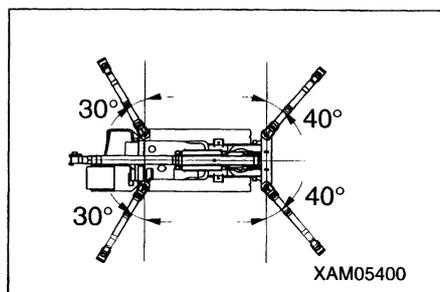
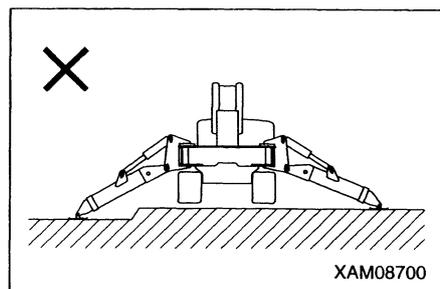
[4] Outriggers extended to minimum

**⚠ WARNING**

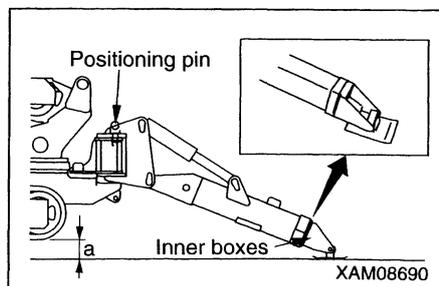
- For crane work, be sure to extend all the outriggers. Never perform any crane work without setting up outrigger. Machine may tip over causing serious injury otherwise.
- Outriggers should be extended while watching leveling instrument so that the machine is set horizontally.
- For working without extending outrigger to maximum, see the values in “Rated Total Load Chart without extending outrigger to maximum” Working under improper value may cause the machine to tip over.
- Swinging 360 degrees with a load lifted may expose the machine to an unstable position. Reduce the working radius and use sufficient care.
- If you want to work with the outrigger extended to minimum, be sure to set the outrigger on level ground and secure the clearance of 50mm between the bottoms of outrigger and track. Do not perform crane work if, due to uneven ground or the like, any one outrigger should be extended in such way wherein such clearance exceeds 50mm, as it may cause the machine to tip over, resulting in serious personal accident.

“Outrigger Extended to the Minimum” at the top of Rated Total Load Chart indicates the status shown in the sketch to the right.

★This “With Outrigger Extended to Minimum” means that outrigger grounding angle is set to pin positions (40 degree front and 30 de-grees rear), inner boxes of all the outriggers are retracted to minimum, all the outriggers are set on level ground and dimension a in the sketch to the right is about 50mm.



★ Even if one outrigger is retracted to its “minimum” position from full (or midway) extension, work should be performed under “With Outrigger Extended to Minimum” configuration.



## 5.4 How to read load indicator

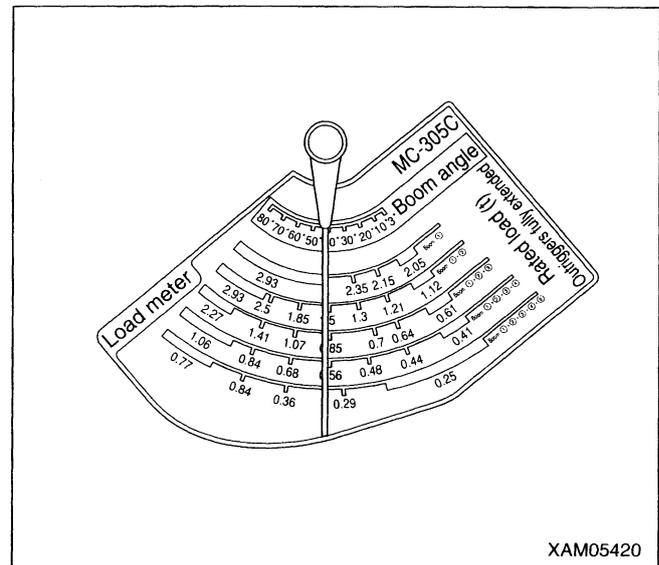
### ⚠ WARNING

- For reading Rated Total Load with load indicator in use, be sure to observe following rules. Serious accident including tipping over and damaging of the crane may be incurred otherwise:
  1. Set up outrigger horizontally over hard ground.
  2. Extend outrigger to the maximum.
- Before lifting a load, determine the boom length to be used (number of stages) and boom angle, compare the rated total load at such position indicated by load indicator with the weight of the object and make sure that the total load consisting of the weights of hook, object and rope never exceeds the rated total load.
- When the outrigger is not extended to the maximum, any rated total load value indicated on load indicator is not useful. Read only the boom angle on the load indicator.

Load indicator is affixed to each side of No.1 boom and consists of pointer and scale board as shown in the sketch to the right.

Load indicator indicates the rated total load with outrigger set on hard, level ground and extended to maximum (See Part I Introduction 5.3 [2] Outrigger extended to maximum), excluding bending of the boom. The load indicator should be read to in the following manner:

- Read the value at the intersection of curve on scale for the boom in use and pointer. It indicates the Rated Total Load for the boom length in use at the time.



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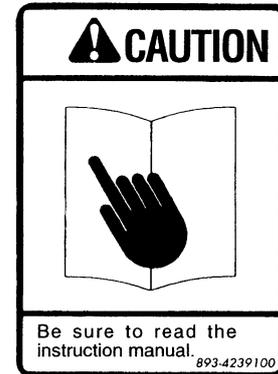
### **⚠ WARNING**

**Read and observe these safety related rules thoroughly. Violating this manual can result in an accident involving serious injury or death.**

### 1. Basic Rules

#### Follow the instruction manual and caution plates.

- Read and understand this manual and caution plates affixed to the machine. Operating the machine without fully understanding them may lead to improper operation resulting in an accident involving personal injury or damage to the machine.
- Understand proper method of using and servicing this machine to perform operation safely.
- This manual and caution plates on the machine should always be kept legible. When they become illegible, replace them quickly by obtaining from your dealer.

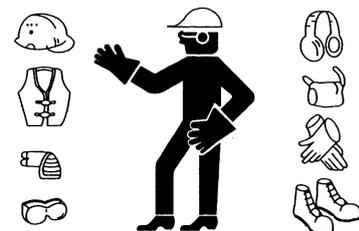


#### Qualification to operate

- Official qualification may be required to operate this machine.
- ★ See “Part I Foreword, 4. Qualification for operation” in this manual for detail.
- It is essential that any beginner even with qualification receives sufficient education and training on handling of this machine in the organization he or she works for, to acquire satisfactory operating technique before starting to work.
- Operator should receive sufficient training and acquire sufficient operating technique before starting to operate the crane.

#### Protective items and clothing

- Be sure to wear hard hat, safety shoes and safety belt.
- Select and wear protector suitable to particular work.
- Do not wear excessively large clothing or accessory which may be caught by control lever or other projection, causing the machine to make unintended movement.



A0055010

**Rules for safe operation**

- Follow instruction or signal of management and leader, to work with priority placed on safety.
- Work while observing the basics of crane work.
- Be sure to conduct prescribed inspection before starting operation and work.
- Do not work under weather conditions of gale, thunder or fog.
- Never operate the machine when you are tired, under the influence of alcohol or sleep inducing drugs.
- For performing operation, inspection or service, be sure to observe working rules, safety regulations and operating procedures.
- Pay attention to surroundings and pedestrians when working. When a pedestrian carelessly approaches, suspend your work and take measures to give a warning.
- Always be alert while operating the machine against unexpected happenings and be ready to address them.
- Never operate the machine beyond its performance or application specified in this manual.
- Be sure to observe prescribed rated total load and working range.
- Never operate the machine looking aside, recklessly or forcibly.

### **Before operating a machine as that been leased to or driven by others:**

Before operating any machine which has been on rental or use by others, make sure of the following in writing. Check the past services including voluntary periodical inspection, based on the inspection record as well:

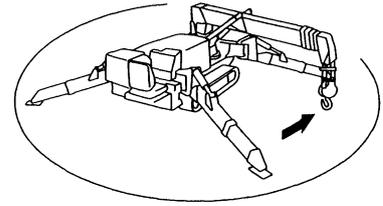
- (1) Crane capacity
- (2) How the crane has been serviced
- (3) Habit or weakness of the particular crane
- (4) Miscellaneous matters to be watched in connection with operation.
  - (a) Function of brake and clutch
  - (b) Availability and function of flood light, rotational light, etc.
  - (c) Function of hook, winch, outriggers etc.

### **Provision for safety protections**

- Make sure that all the guards and covers are properly in place and if not, be sure to correct promptly.
- Use safety systems properly after fully understanding their usage.
- Never remove safety systems and always maintain them to function properly.
- Incorrect use of safety system may result in a serious accident.

**Follow the instruction and signal to work.**

- For crane work, designate a leader and signals beforehand to proceed with the work in accordance therewith.
- Any work that is likely to create a blind spot should be carried out with particular care by following the instruction and signal of the leader.
- For joint work with two or more cranes involved, “certain signals” should be established and confirmed by everyone concerned.
- Crane work by nature contains the risk of causing worker’s arm or finger to be caught between boom and undercarriage or clearance of moving parts of boom hoist cylinder. Operator should make certain that there is no person inside the working radius.



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**For prevention of trouble**

- Always conduct inspection and service carefully to prevent trouble from developing.
- If any abnormality is felt with respect to your machine, suspend the work immediately and report to a superintendent.
- With respect to the countermeasures to prevent consequential disaster, have the sharing of duties established beforehand.
- When any fuel or hydraulic oil is leaking from the machine, do not operate it but report to a superintendent and eliminate such leakage completely before continuing the work.
- Before leaving the machine, ground any lifted load, shutdown engine and remove the engine key.



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## II SAFETY

### Temporary storage of troubled machine

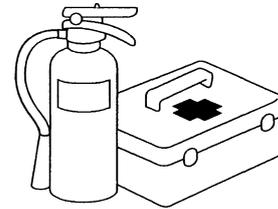
For temporary storage of troubled machine waiting for service, let everyone on the job site know that the use of machine is prohibited in the following manner.

- Post the prohibition conspicuously, with outline of trouble, personnel to contact and time limit for storage indicated.
- For parking such machine, apply chocks to rubber track for prevention of rolling.
- Remove engine key before leaving the machine.

### Provision of fire extinguisher and first aid kit

Be sure to observe following in preparation for unexpected injury or fire:

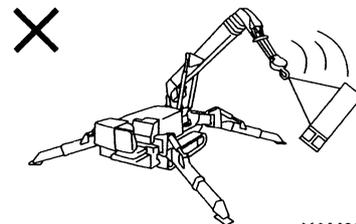
- Have fire extinguisher installed at designated location and its instruction label read by everyone for ready use in emergency.
- Determine the location to keep first aid kit. It should be periodically checked and replenished as required.
- Have measures against and procedures for injury or fire established beforehand
- Have procedures for notifying an emergency contact (doctor, ambulance, fire station) established and displayed conspicuously so anyone at the site can act properly.



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### Work reasonably and carefully

- Abrupt lever operation and jerky machine operation should be avoided.
- When two or more cranes are closely positioned to work, operate them carefully, paying attention to avoid tipping over due to contact. Place a guide as necessary for prevention of such contact.
- When you notice any trouble or danger, discontinue the work immediately to avoid the risk.
- Discontinue your work under bad weather (heavy rain, gale, thunder or dense fog). Such judgment should be made in accordance with “Standard for discontinuing work” as well as judgment of leader.



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**Do not make modification**

Do not make any modification to your machine without our written consent. Any modification involves an issue of safety and should be discussed with our service personnel. We can not be responsible for any injury or other trouble due to modification without our consent.

**Safety during refueling**

- This machine operates using light oil. Make sure to use fuel of proper type. Wrong fuel will cause damage to engine.
- Be sure to shutdown engine for refueling. Refueling with engine running may cause inflammation of spilled fuel at heated muffler.
- Over-refueling is dangerous with spilling. Try to refuel on the lower side of specified level. If spilled, be sure to wipe it off completely.
- After refueling, be sure to close tank cap firmly.



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A0055040

**Do not allow any fire to approach oil**

Inflammation may result if any fire should approach fuel, hydraulic oil or engine oil. Observe following rules strictly:

- Do not allow lighted cigarette or match to approach any inflammable matter.
- Cap of fuel or oil can should be closed tightly.
- Fuel or oil should be stored in well ventilated area.
- Fuel or oil should be stored at a specified location and do not allow any unauthorized person to approach.
- Do not leave the spot during replenishment.

During refueling in particular, be sure to observe rules provided in preceding subparagraph "Safety during refueling".

- Any fuel or oil spilled during replenishment should be wiped off immediately.



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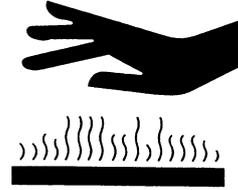
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## II SAFETY

### High temperature

Immediately after operation, engine oil or hydraulic oil is hot and pressure has been built up inside the hydraulic tank. Under such condition, you may incur scalding by removing cap or replacing oil, coolant or filter. Wait for the temperature to drop before proceeding with following procedure:

- To avoid blowing of hot oil, shutdown engine and wait for the temperature to drop. Loosen cap slowly to release pressure before removing it. (Feel the oil temperature by holding your hand close to the tank surface but not by touching it directly.)



A0055050

### To avoid injury due to crane

To avoid accident resulting in serious injury or death, do not place any part or whole of your body in clearances such as follows:

- Between boom and undercarriage
- Between outrigger float and ground
- Between boom or post and hoist cylinder
- Between winch drum and wire rope
- Between sheave and wire rope
- Between track and ground



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### Exhaust gas

For starting up engine or handling fuel, cleansing oil or paint indoors or in poorly ventilated area, be sure to open window or door for prevention of poisoning by gas. If ventilation is still insufficient even with window or door opened, install ventilation fan.



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## 2. Rules for Operation

### 2.1 Before starting up engine

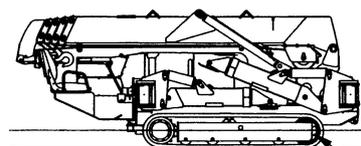
#### Securing safety in job site

- Make sure that there is no danger in job site before starting your work.
- Check ground and surface conditions of job site to select the most suitable work method.
- Eliminate inclination in job site where possible, before proceeding with your job. In case of heavy cloud of dust, water the job site.
- For work on road, place guide or fence to prohibit entry and secure safety of pedestrian or machine.
- Take necessary measures to prohibit entry of unauthorized person to job site.

Approaching moving machine may lead to serious accident of injury or death by contacting or being caught.

- For travelling in water or crossing a ford, check the ground conditions, depth and speed of flow first to make sure that it does not exceed the allowable depth (up to center of idler ①).

★ See Part II Operation, 2.11 [2] Allowable depth of water for detail.



XAM05250

## II SAFETY

### Checking the engine before starting up

Prior to the first start up of the day, conduct following inspection:

Its negligence may result in serious accident involving injury or death.

- Check for leakage of fuel or oil, deposit of inflammable matter around engine or battery.
  - ★ See Part III Operation, 2.1.1 Checking around the machine for detail.
- Check fuel and hydraulic oil tanks for proper level, air cleaner for clogging, wiring for any damage and function of safety systems and instrument.
  - ★ See Part III Operation, 2.1.2 Inspection before starting your work for detail.
- Make sure that control levers are in Neutral. Check that control linkages function satisfactorily.

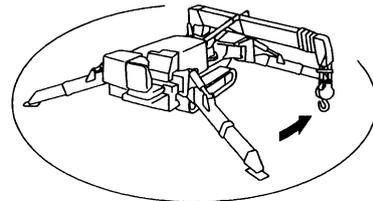
Based on the result of above checking, be sure to correct any abnormality.



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### Rules for starting up the engine

- Before starting up the engine, make sure that there is no person or other obstacle within the radius of boom swing.
- Be sure to sound horn for warning when starting up your engine.
- Do not use short circuiting of starter circuit to start the engine. It may cause fire.



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## 2.2 After the engine has started

### Inspection after starting the engine

Negligence of inspection after starting engine will delay detection of trouble in machine resulting in personal injury or damage of machine.

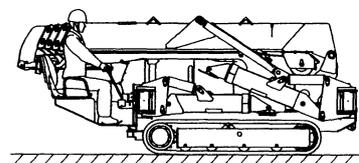
Inspection should be carried out in a wide area without obstacle. Do not allow anyone to approach the machine.

- Check actuation and travel of the machine, function of outrigger, and function of crane including winching and hoisting, telescoping, and swinging of boom.
- Check for abnormal sound, vibration, heat or smell of the machine or leakage of air, oil or fuel. Pay particular attention to the leakage of fuel.
- Any abnormality should be corrected whenever it is detected. Using the machine without correction may cause unexpected personal injury or machine trouble.

### Rules for starting the machine

In order to avoid serious injury or death, be sure to observe following rules whenever you move the machine.

- Let the machine assume "Travel Position" as shown in sketch to the right: Do not travel the machine without locking the hook block.
  - Lower and retract the boom all the way.
  - Winch up the hook all the way before locking it.
  - Retract the outrigger.
- ★ See Part III Operation 2.5 Travel position of the machine for detail.
- Make sure again that there is no person or other obstacle around, before starting to travel.
- When starting, sound the horn for warning.
- Travel operation should be made while seated in operator seat.
- This machine is not allowed to carry any person or load on its undercarriage or boom, except for the operator.

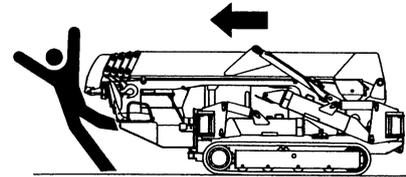


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### Rules for reversing travel or changing travel direction

In order to avoid serious injury or death, be sure to observe following rules whenever you move the machine.

- Before switching from forward to reverse travel or vice versa, decrease speed on the earlier side and bring the machine to a complete stop.
- For switching forward/reverse or changing direction, sound the horn to give warning.
- Make sure that there is no person around the machine. Particularly, because there is a blind spot in front of the machine, stop the machine as necessary to make certain that there is no person in front or around the machine.
- Use a guide wherever hazardous or view is poor.
- Do not allow any person to enter any area where you are travelling or changing direction in.

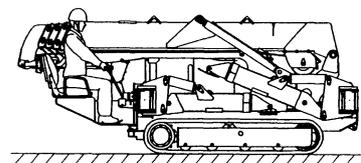


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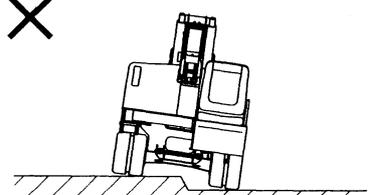
### Rules for traveling

In order to avoid serious injury or death, be sure to observe following rules whenever you travel the machine.

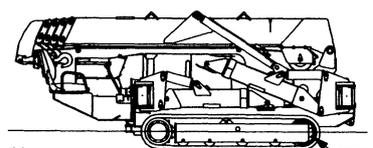
- While travelling pay attention.
- Avoid speeding and making jerky start or stop motions or sudden turns. Avoid zig zag travel.
- When any abnormality is detected during operation such as abnormal noise, vibration, smell, error in instrument or leak of fuel or oil, stop the machine immediately at appropriate location to check for the cause.
- Avoid making sudden change of direction. It may cause the loss of balance or damage the machine or nearby structure.
- For travelling over uneven ground, use low speed to avoid tipping over and do not make jerky operation for changing direction. Try not to go over obstacle where possible. If inevitable, use as low speed as possible. Further, do not go over any obstacle which may cause the machine to incline extremely (more than 10 degrees). While travelling, for prevention of contacting with other machine or structure, keep a roomy distance from them.
- For travelling in water or crossing a ford, check the ground conditions, depth and velocity of flow, not to exceed the permissible depth. See Part III Operation, 2.11 [2] Permissible water depth for detail.
- Before travelling over any bridge or other structure in privately owned land, make sure that they withstand the weight of this machine. As for public road, check with competent authority and follow its instruction.



XAM05150



XAM05240



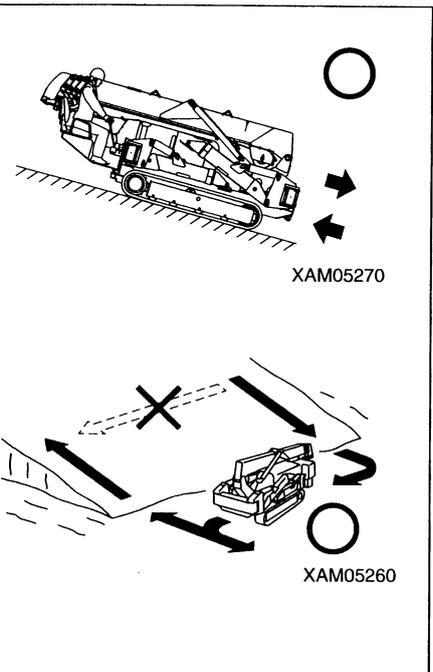
XAM05250

## II SAFETY

### Rules for travelling on slope

In order to avoid serious injury or death, be sure to observe following rules whenever you travel on slope.

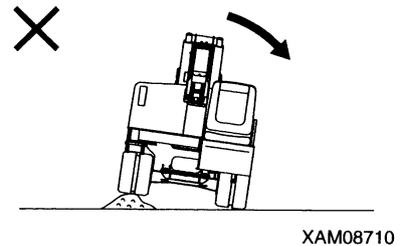
- When travelling on slope, use care for tipping over or skidding sideways.
- Do not attempt to change travel direction on or to cross a slope. Go down to flat area and detour for safety.
  - ★ See Part III Operation 2.11 [3] Rules for travelling up- or downhill for detail.
- On grass, fallen leaves or wet steel plate, even with small inclination, machine is more likely to skid sideways than imagined.
- Avoid to position your machine laterally to slope where possible and try to slow down. When going downhill, travel slowly. Apply brake (travel lever in Neutral position) as necessary.



### Be careful about tipping over on unsteady ground

In order to avoid serious injury or death, be sure to observe following rules whenever you have to travel over uneven ground:

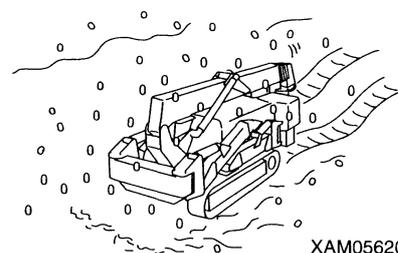
- Do not enter soft ground. It may be difficult to escape.
- Do not approach precipice, shoulder, deep ditch because ground is unsteady around there. Landslide due to mass or vibration of the machine will cause the machine to tip over or fall down. Ground, immediately after heavy rain fall, blasting or earthquake will be prone to landslide.
- Over a banking or near an excavated ditch, ground is unsteady. Do not approach where possible. Machine may incline due to its mass or vibration.



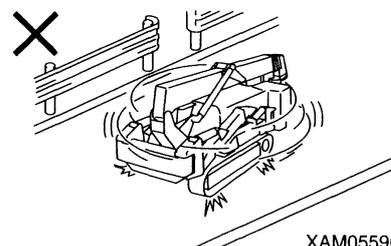
### Rules for accumulated snow or frozen ground surface

In order to avoid serious injury or death, be sure to observe following rules whenever you have to travel over accumulated snow or frozen ground surface:

- Snow accumulated or frozen surface is slippery even with a small inclination. Slow down and avoid making jerky start, stop or turn. Particularly going up or down a slope is slippery and hazardous.
- Frozen surfaces become unsteady to travel the machine on. The ground will become soft as the temperature rises.
- In a cold climate, before attempting to lift, check to see that the load is not stuck to ground or anything else because of freezing. Attempting to lift a load frozen to the ground or anything else without knowing, is dangerous.
- In cold climate, do not touch metal surface or the like with your bare hand or finger. Touching metal surface of a machine in extremely cold climate may cause your skin to freeze to metal surface.
- Remove any snow or ice deposited on your machine as it makes difficult to read caution plates. Particularly, if deposited on boom it should be removed without fail, as it may fall down.



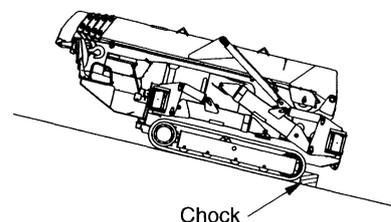
XAM05620



XAM05590

### Rules for parking

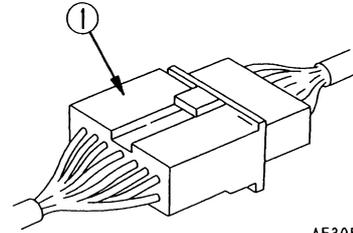
- For parking the machine, select flat surface without danger of falling rock, land sliding or being flooded.
- When parking on slope, apply a chock to prevent the machine from rolling.
- For parking on road, place caution sign including flag, protection fence, flood light or the like within the limit not to disturb traffic.
- Before leaving the machine, shutdown the engine. Be sure to keep the engine key at designated location.



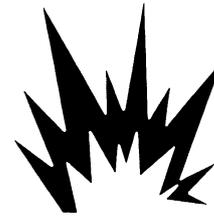
XAM05210

### Rules for cold climate

- After finishing work, wipe any water, snow or mud off the wire harness, connector ①, switches and sensors before covering them. Freezing of ingressed water may cause the machine to malfunction, resulting in unexpected accident.
- Remove or defrost snow or ice around swing gear, boom or winch and make sure that they function properly.
- Conduct sufficient warm-up run. Without sufficient warm-up run, reaction of the machine to control levers and switches will be slow, leading to unexpected trouble.
- Rapid acceleration of the engine immediately after its start-up should be avoided.
- Operate the control lever to relieve hydraulic pressure (raise the pressure to exceed its set level so that hydraulic oil is released to its tank) to increase temperature of oil in the circuit. This will improve reaction of machine and prevents malfunctioning.
- When electrolyte is frozen, do not charge the battery or try to start up engine with other battery. It may cause inflammation of the battery. Before charging battery or starting up the engine using other battery, first defrost the electrolyte and make sure that there is no leakage.



AE305820



A0055110

## 2.3 During crane operation

### Inspection before starting your work

Make sure that function of safety system and crane is normal.

- Operate control levers and switches at no-load and make sure that they function normally. If any abnormality is detected, correct it immediately.
- Make sure that safety systems including over-hoist warning system function normally.

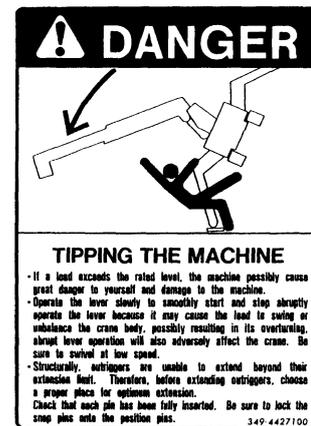
### Rules for selecting location for placing outrigger float

For crane work, be sure to use the outrigger. Performing crane work without outriggers set, may result in tipping over of the crane.

Be sure to place outriggers on level, hard and steady ground.

Placing them on following type of ground is hazardous:

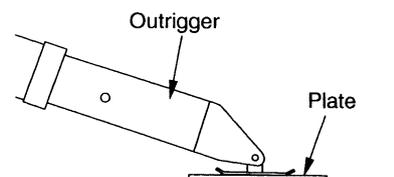
- Random paved asphalt surface
- Thin concrete paved surface
- Stone paved surface
- Where underneath of pavement having been eroded by water to become hollow, surface appears to be solid but inside is soft.
- Near any shoulder or hole for work.
- Inclined ground.



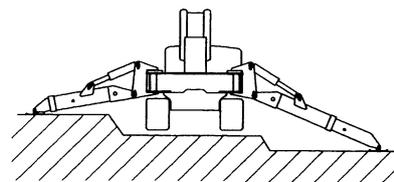
### Rules for setting up outrigger

In order to prevent accident of serious injury or death, for setting up outrigger, observe following rules:

- When setting up outrigger, do not allow any person to approach. Serious accident may result, such as your foot being caught by outrigger float.
- Except for extending or retracting outrigger cylinders, have the engine shutdown, because if anyone inadvertently touches the outrigger switch, the cylinder may be actuated unexpectedly and cause an accident.
- All the outriggers should be extended firmly. After having extended outriggers, make sure that they are all well grounded.
- Over soft ground, use a plate under the outrigger floats.
- When you must set up outrigger near a shoulder, take every possible measures to prevent collapsing of the shoulder.
- Outriggers should be set up while checking with leveling instrument so that the levelness of machine is secured. During crane work as well, the leveling instrument should be referred to once in a while in order to maintain the levelness of machine.
- For working on slope, be sure to have the ground under outrigger float and track leveled before setting up the outrigger. Setting up outrigger on inclined ground without having it leveled, may cause the machine to becomes unstable.

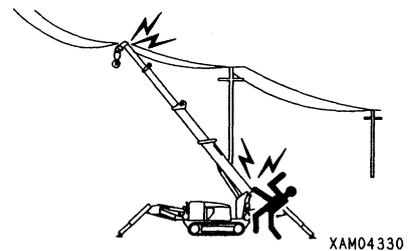


XAM05860



### Watch out for overhead power line

- Do not allow the machine to touch overhead power line. If it is high tension line, electrification may result by just approaching.
- Observe following rules in order to avoid accident:
  - At any job site where there is a possibility of boom or wire rope contacting power line, discuss with the power company or make sure that measures set forth in related regulations (such as placing a guard, sheathing the line or posting caution board) have been taken, before starting the work.
  - Wear rubber soled shoes and rubber gloves and be careful not to allow any portion of your body which is not protected by rubber or the like to come in contact with boom, wire rope or machine.
  - Place a guide to watch for the boom, wire rope or machine not to approach too closely to the power line. Sign for emergency should be established beforehand.
  - Inquire about voltage of power line at job site.
  - Be sure to keep following distance between the boom, machine and power line:



|  | Power line voltage | Minimum safety distance |
|--|--------------------|-------------------------|
| Low voltage<br>(Distribution line)     | 100 - 200 V        | 2 m                     |
|  | 6,600 V            | 2 m                     |
| Special voltage<br>(Transmission line) | 22,000 V           | 3 m                     |
|  | 66,000 V           | 4 m                     |
|  | 154,000 V          | 5 m                     |
|  | 187,000 V          | 6 m                     |
|  | 275,000 V          | 7 m                     |
|  | 500,000 V          | 11 m                    |

## II SAFETY

### Pay attention to weather information

- When there is any possibility of lightning, discontinue crane work, ground the load immediately and retract the boom.
- When load sways due to wind, the machine becomes unstable. If such is the case, ground the load immediately and retract the boom.
- When the maximum instantaneous wind velocity reaches 10m/s, discontinue the crane work, ground the load and retract the boom.
- Even when the maximum instantaneous wind velocity is less than 10m/s, the greater the lifted load, the higher the load is lifted or the longer the boom, the greater the influence of wind. Work should be carried out with sufficient caution.
- When lifting any load having wide area being exposed to wind such as steel plate, wind from front, rear or side of boom can cause tipping of the machine or damage to the boom. Sufficient attention should be paid.
- ★ In case of earthquake, suspend your work and wait until it settles down. Chart below is the guide of wind velocity and its effect. Wind velocity in weather information represents a mean velocity (m/s) for 10 minutes at 10 meters above ground.

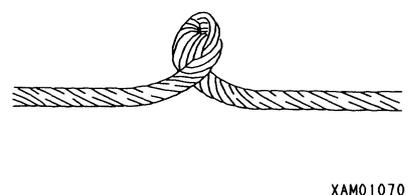
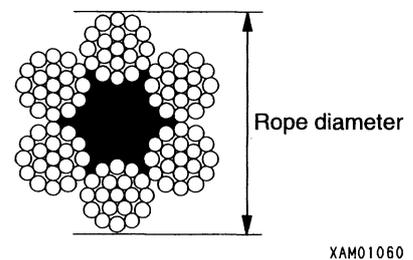
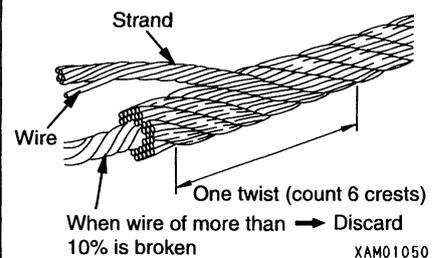
| Wind velocity (m/s) | Effect of wind  |
|---------------------|---|
| Up to 0.3           | Quiet breeze. Smoke rises straight up.  |
| 0.3 ~ 1.6           | Direction of wind can be known as it streams but anemoscope does not detect it.         |
| 1.6 ~ 3.4           | Wind felt by face.<br>Leaves move constantly and anemoscope starts actuating.           |
| 3.4 ~ 5.5           | Leaves and twigs moves constantly. Light weight flag opens.                             |
| 5.5 ~ 8.0           | Dust rises, small piece of paper flies and twigs move.                                  |
| 8.0 ~ 10.8          | Shrub with leaves starts to rustle.<br>Wave crest develops in lakes and marshes.        |
| 10.8 ~ 13.9         | Big branches move. Power line howls. Hard to use umbrella.                              |
| 13.9 ~ 17.2         | Entire tree sways. Hard to walk against headwind.                                       |
| 17.2 ~ 20.8         | Branches break. Impossible to walk against headwind.                                    |
| 20.8 ~ 24.5         | Slight damage incurred by residential house.<br>(Chimney falls and roof tiles come off) |
| 24.5 ~ 28.5         | Not frequently experienced inland. Trees uprooted.<br>Major damage to houses.           |
| 28.5 ~ 32.7         | Scarcely experienced. Destruction in broad region incurred.                             |

### Rules for wire engaging

- Before lifting load, make sure of the following: Lifting load without checking, may result in serious accident of injury or death by falling of the load or tipping over.
  - Observe values in rated total load chart.
  - Lift at the center of gravity of load.
  - Make sure that wire rope for hook block is in perpendicular.
  - After lifting off the ground, stop hoisting the load once to make sure that the load is stable.
- Before lifting wired load, be sure to check that wire rope holding device at hook block is securely in place. If not, wire rope may come off the hook block, causing serious accident with the load falling.
- When the angle of wire rope while lifting a load is great, even with the load of same weight, the load applied to the rope will be greater and can break the rope. Wiring work should be performed with careful attention paid so that wire rope is not exposed to unreasonable force.
- Lifting a long shaped load is dangerous as the load is unstable. In such case, lift it vertically with connect ropes to each end of the load for improvement of stability.

### Rules for handling wire rope

- Wire rope incurs fatigue as the time goes by. Before every work, check it and promptly replace any rope which has reached replacement standard. Simultaneously, check sheaves at boom end and hook block. Damaged sheave accelerates the damage of rope.
- Use the wire rope that the manufacturer specifies.
- Be sure to wear leather gloves whenever you handle wire rope.
- Do not use any of the following wire ropes:
  - Where a kink has developed.
  - Where extreme deformation or corrosion has taken place.
  - Those which have incurred heat or spark.

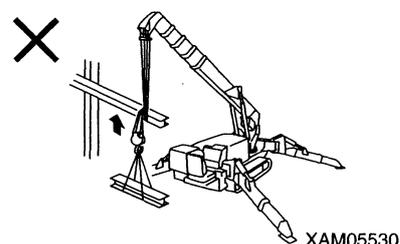
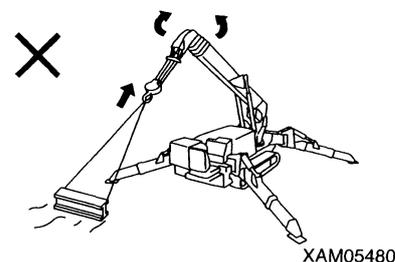


### Rules for crane operation

- Any work beyond the capability of machine will be a cause for serious accident including tipping over or breakage or any other trouble. Perform crane work in accordance with the rated total load chart.
- Never travel with any load lifted. Crane may tip over resulting in serious accident of injury or death.
- Be sure to operate slowly. Sudden operation of lever or accelerator may cause a load to sway, fall or collide into surroundings. Swing motion in particular should be performed at low speed.
- There is a danger of load falling or contacting which may lead to serious accident of injury or death. Do not allow any person to enter inside the working radius or underneath the load. Working radius increases due to bend of boom as a load is lifted, which should be taken into account.
- Crane work in poor visibility or bad weather is dangerous. In dark area, use flood light or other lighting system to secure brightness. If view is poor due to bad weather (rain, fog, snow, etc.), discontinue your work and wait for weather to improve.
- Do not use the crane for any duty other than its primary usage.
- When the buzzer of over-hoist preventive device sounds, take your hand off the winch lever immediately. Hoisting of the hook block will stop. Then, operate winch lever to Lower position (push forward) of the hook block.
- As you extend the boom, the hook block will be hoisted. Therefore, when you extend the boom, keep lowering the hook block by pushing the lever forward.
- If, during work, overloading should take place, lower the load by pushing winch lever forward. Rapid hoisting or lowering of the boom should be avoided because it may cause an accident by tipping over.
- Volume of hydraulic oil in each cylinder will vary as its temperature changes. If you leave the machine stopped with a load suspended, the oil temperature will drop as the time elapses and as the volume reduces, hoist angle or length of the boom will also be reduced. If such is the case, correct it by performing action for boom hoist or extension appropriately.
- Do not leave operator seat, leaving a load suspended. If you have to, be sure to lower the load.
- When not in use, have the hook block wound up to prevent any person from colliding with empty hook block.
- While a load is suspended, any area underneath the boom or above an imaginary straight line over the boom and extension thereof is extremely hazardous in case the winch wire happens to break or the like. Make sure that no person including operator is allowed to enter such zone.

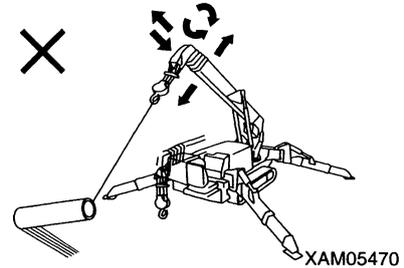
### Rules for operating the winch

- Do not allow any person to enter under a lifted load.
- When lifting a load, be sure to stop it at a point where the load is off the ground to check for stability of the load and safety of weight before continuing to lift.
- Dragging, pulling in or lifting at an angle to the load is prohibited. Crane may tip over or be damaged.
- Lift a load while using care not to allow wire rope or lifted load to contact with an obstacle such as a tree or structure. If entangled with an obstacle, do not attempt to hoist forcibly but disentangle it first before continuing to lift.
- Do not use a disorderly wound wire rope off the winch drum. Leaving this rope wound disorderly on drum not merely shortens the useful life but can break the rope causing serious accident. Observe following rules to prevent wire rope from being wound disorderly:
  - Do not ground the hook block.
  - When lowering the hook block below ground level for underground work or the like, be sure to leave a minimum of 3 windings of the rope on winch drum.
  - When hook block rotates with the rope twisted, remove such twist completely before resuming your work.
- ★ See Part III Operation, 4.2 Measures to take when wire rope is twisted for detail.



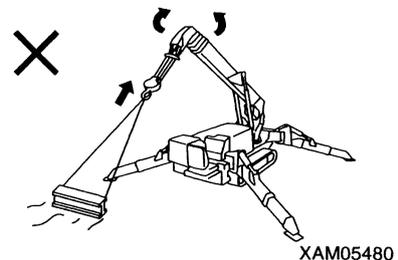
### Rules for operating the boom

- Operate the boom control lever as slowly as possible. In Particular, rapid lever operation with a load lifted will cause the load to sway and give machine a big shock, resulting in damage to the crane or tipping over of the machine.
- Lowering the boom causes working radius to increase but the corresponding rated total load to reduce. To perform your work while hoisting or lowering the boom, use sufficient care so that the mass (weight) of the load with the boom lowered to the lowest angle does not result in overloading.
- Dragging or pulling-in a load with boom hoisting/lowering or telescoping is strictly prohibited.
- When you telescope the boom, pay attention to the hoisting movement of hook block.
- Telescoping of the boom should be done carefully while making sure that the hook block is being hoisted or lowered
  - Extending the boom causes working radius to increase but the corresponding rated total load to reduce. To perform your work while telescoping the boom, use sufficient care so that the mass (weight) of the load with the boom extended to the maximum does not result in overloading.



### Rules for making swing motion

- Before swinging, check for safety of surrounding and sound horn.
- When boom hoist angle is low, be careful that operator is not hit by the boom.
- Swing lever should be operated as slowly as possible. Start smoothly and swing at low speed before stopping softly. Rapid lever operation with a load lifted will cause the load to sway and the balance of machine to be lost, which may result in damage to or tipping over of the crane.
- Dragging in or erecting a load by means of swing motion is strictly prohibited.
- For lifting a load or making a swing, be careful so that the wire rope or lifted load does not contact with obstacle such as tree, steel structure or the like. If entangled with obstacle, do not force to hoist the load but disentangle it first.



**Rules for joint lifting work**

Lifting a load jointly with two cranes involved is very dangerous and should be avoided where possible. When inevitable, observe following rules:

- Use identical model cranes only.
- Select model of crane with plenty of room in lifting capacity for the load.
- Signs should be given by only one person.
- Crane operation should be confined to single function in principle. Do not swing.

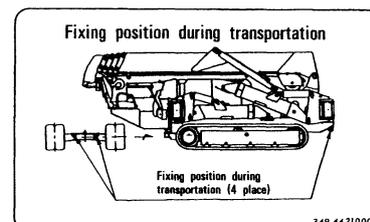
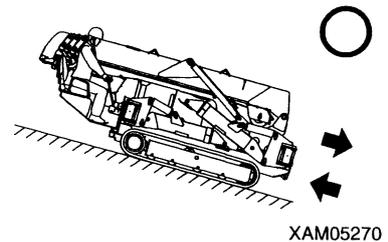
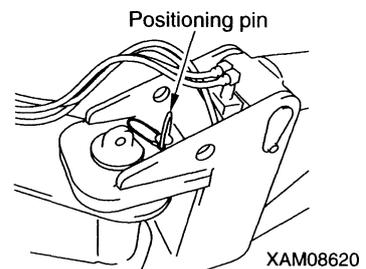
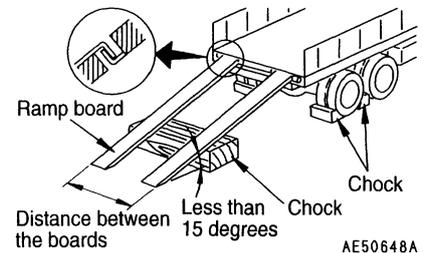
**Working for a lifting height which involves below ground level**

- For winching wire rope in below-ground-level work, be sure to leave at least 3 windings of rope on the winch drum.
- Let every one understand signs in use.
- Operate crane with particular carefulness.

### 3. Rules for Transporting a Crane

#### Rules for loading to and unloading from truck or trailer

- Loading and unloading involves a lot of danger. Particular care should be used.
- Select level and hard ground for loading and unloading.
- Angle of ramp board should be less than 15 degrees. Set the distance between the boards to match the track centers.
- For loading or unloading of the crane, be sure to let the crane assume "Travel position" with position pins (4) securely inserted at the rotary.
- ★ See Part III Operation, 2.5 Travel Position of the Machine for detail.
- Be sure to load the machine by travelling backward. Loading by travelling forward may cause tipping over.
- Be sure to unload the machine by travelling forward. Unloading by travelling backward may cause tipping over.
- For loading or unloading, run the engine at idling speed and drive the machine at low speed.
- Use ramp board having sufficient strength in terms of its width, length and thickness for safe loading and unloading operation.
- To avoid side skidding of the machine on ramp board, remove dirt off the undercarriage. Also keep the board clean with any deposit of grease or oil removed. Be extra careful on rainy days as it gets slippery.
- Never correct the travelling course on the ramps. If you want to, take the machine off the ramps to change the direction.
- For changing direction on the truck bed, operate slowly because foothold is unsteady.
- After loading, engage chock and lock the machine securely with holding ropes.
- ★ See Part III Operation, 5.1 Loading and Unloading Procedure for detail.
- ★ See Part III Operation, 5.3 Rules for loading the machine for detail.



**Rules for transport**

When transporting the machine, follow local rules and regulations.

**Rules for loading and unloading by means of a crane**

Observe following rules for loading and unloading the machine with a crane.

- For lifting, attach shackles ① to outrigger rotary holes (at the 4 locations).
- Engage slings ② (4 slings) to hook ③.
- The crane and shackles ① (slings, shackles, etc.) for lifting duty should be sufficiently strong for the mass (weight) of the machine.
- For lifting the crane, be sure to let the crane assume “travel position” with position pins (x4) inserted at the rotary. Location of its gravity center has been established with the crane in travel position.
- ★ See Part III Operation, 2.5 Travel Position for detail.
- For transporting the crane by means of other crane, use transporting devices as shown for your safety.

★ Recommended shackles:

- Slings: 2 for front

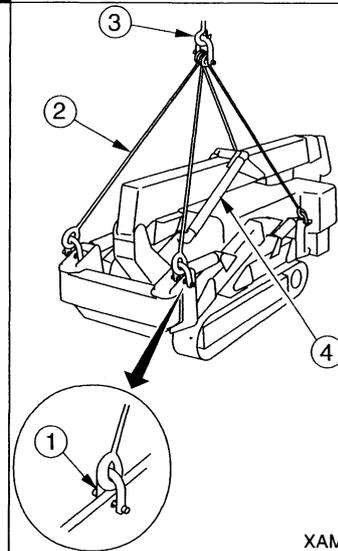
JIS13 Rope or equivalent. 12.5 dia. x 2150 long. (Breaking load: 7.5t or greater) with an eye-lock at one end and nominal 12A type thimble at the other end.

- Slings 2: for rear

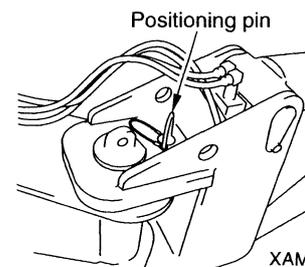
JIS13 Rope or equivalent. 12.5 dia. x 1650 long. (Breaking load: 7.5t or greater) with an eye-lock on one end and nominal 12A type thimble at the other end.

- Shackle:

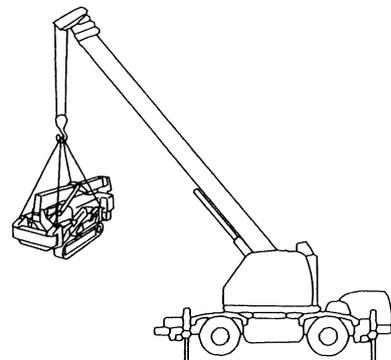
Nominal 14 of BC or SC.



XAM06330



XAM08620



XAM06320

Load per single line of  
4 pat hanging  
**943 kg**  
349-4420300

## 4. Rules for Handling the Battery

### Rules for Handling the Battery

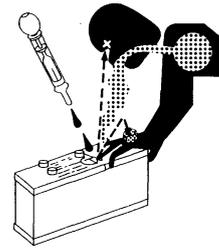
Electrolyte contains dilute sulfuric acid and it generates hydrogen gas as well. Its improper handling may result in injury or fire.

Observe following rules:

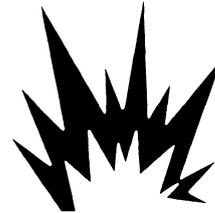
- Do not allow any fire including lighted cigarette to approach battery.
- For handling battery, be sure to wear goggles and rubber gloves.
- If electrolyte gets on your clothing or skin, wash it away with plenty of water immediately.
- If electrolyte gets in your eyes, wash it away and see doctor promptly for treatment.
- If you swallow electrolyte inadvertently, drink plenty of water, milk, raw eggs or vegetable oil and see doctor immediately.
- Clean the top of battery with wet and clean cloth. Use of organic cleanser such as gasoline or thinner is prohibited.
- Tighten battery caps securely.
- When electrolyte is frozen, do not charge or try to start the engine with other power supply. It may cause the battery to explode.
- For charging or starting engine with other battery in use, first defrost the electrolyte and make sure it is not leaking.
- Before charging the battery, be sure to remove it from the machine.



A0055040



A0055090

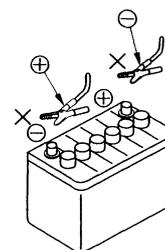


A0055110

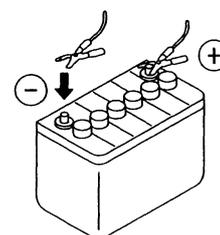
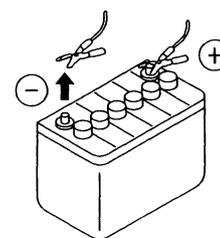
### Rules for starting the engine with booster cable in use

Improper connection of booster cables may cause fire. Observe following rules.

- Start engine with two persons attending; one in operator seat.
- For starting up the engine with other machine involved, make sure that two machines do not come in contact with each other.
- Before connecting booster cables, starter switch keys should be turned off on both of the normal and troubled machines.
- Booster cables should not be connected in opposite {(+) with (-) and (-) with (+)}.
- Connection should be made with (+) terminal first and disconnected with (-) terminal (earthing end) first.
  - ★ See Part III Operation 8.4 Starting up with booster cable for detail.
- When disconnecting booster cables, avoid any contact between the cable clips or between the clip and machine.



A0067320

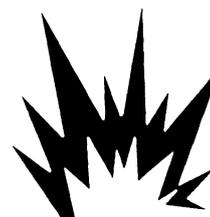


XAM04590

### Rules for charging the battery

Battery can explode with improper handling for charging. Follow the direction provided in this manual as well as battery manual and observe the rules shown below:

- ★ See Part III Operation, 8.3 Rules for charging the battery for detail.
- Move the battery to well ventilated area and remove caps to allow diffusion of hydrogen gas and prevent explosion.
- Adjust the voltage of charger to that of battery to be charged. Incorrect voltage adjustment can result in overheating and explosion of the battery.
- Securely connect the (+) charging clip of the charger to (+) terminal of the battery, before connecting (-) charging clip to (-) terminal of the battery.
- Charging current should be set to a value less than 1/10 of rated capacity of the battery. In case of boost charging, set it below the value of rated capacity of the battery.
- Charging battery excessively may lead to inflammation and explosion with electrolyte leaking or drying up.



A0055110

## 5. Rules to Observe in Connection with Services

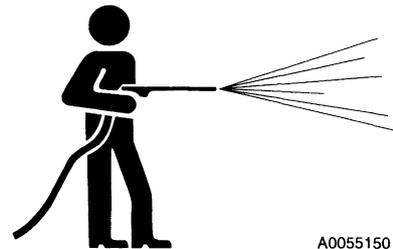
### 5.1 Before starting the service work

#### Notification on trouble

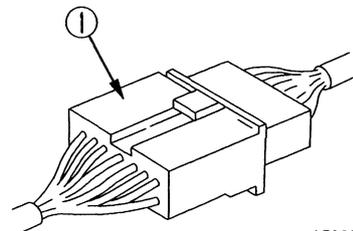
Conducting any service that is not described in this manual may result in unexpected trouble. Notify your dealer about it.

#### Proceed with inspection and service only after cleaning the machine.

- Before conducting inspection and service, clean the machine to prevent dust from entering and so that you can service safely.
- Inspection and service conducted with the machine remaining smeared will not merely makes it difficult to detect deficiency, it will cause dust or dirt to enter your eyes or you incur injury by slipping or falling.
- For washing the machine, observe following:
  - When using high pressure steam for cleaning, wear protectors.
  - Avoid accident of getting a cut or dirt entering your eyes by touching the high pressure.
- Do not wash electric systems (sensors, connectors, receiver boxes) is the wrong pictures ①. Water entering electric system is hazardous as it causes actuation deficiency, leading to malfunctioning.



A0055150



AE305820

#### Keeping job site neat and clean.

Keeping job site neat and clean. For your working safety, keep your job site clean by moving tools and hammers out of your way and wiping off slippery grease or oil. Leaving job site disorderly will expose you to risk of stumbling and slipping.

**Joint work should be performed under direction of leader.**

For performing machine repair or installation or removal of attachment, designate a leader and follow his or her direction. Failure to understand command among joint workers can lead to unexpected accident.

**Use proper tool.**

Do not use broken, deteriorated or wrong tool for your purpose. Chip of rounded chisel or hammer can even blind you if it gets in your eyes.



A0055120

**Lighting system**

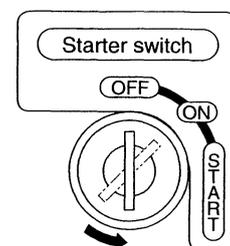
- For checking fuel, oil or electrolyte, use lighting system of explosion proof type. If not, an explosion may result.
- Working in dark area without flood light may lead to accident. Be sure to use lighting properly. Just because it is dark, do not use fire of cigarette lighter or the like in place of lighting. Fire or explosion due to inflammation of electrolyte gas could result.



A0055160

**Shutdown engine for inspection or service**

- For inspection or service, be sure to park the machine on level and hard ground without possibility of falling rocks or land slide or being flooded, with boom totally retracted and lowered and engine shutdown.
- Operate all the crane control levers back and forth for a few repetitions to release residual pressure in hydraulic system.
- Apply chocks to rubber tracks to prevent the machine from rolling.
- Any service personnel should be careful so that his or her body or clothing does not contact any moving part.



XAM05230

### Prevention of fire breaking out.

During service work, dangerous object having risk of inflammation including fuel or battery will be handled.

Following should be strictly observed:

- Fuel, oil and grease should be stowed away from fire.
- Do not leave place of your duty during replenishment of fuel and oil.
- For parts cleaning, use incombustible type of cleanser and avoid inflammable light oil, gasoline or the like.
- Do not smoke while conducting inspection or service.
- When inspecting fuel, oil or electrolyte, use explosion proof lighting and do not use cigarette lighter or matches in place of lighting.
- Loosened or damaged electric connection can cause fire by short circuiting. Check it during pre-operation check. Make sure that fire extinguisher is available in the vicinity of your place of inspection and service.



A0055020



A0055040

## 5.2 During service work

### Unauthorized entry prohibited

During service work, do not allow any unauthorized person to enter.

Place a guard as required. Use particular care during grinding, welding or driving work.

### Action to take when abnormality is found during inspection

- During inspection, if abnormality is found, be sure to correct it.  
Using the machine without correcting defect may result in accident involving injury or death.
- Depending on the trouble involved, contact your dealer.

### Do not drop tool or parts into the machine

- When carrying out inspection with access panel or filler port of tank opened, try not drop bolt, nut or tool into the machine. Dropping them may cause damage or malfunction of the machine, leading to accident. If you should drop anything, be sure to pick it up.
- Do not leave anything in your pocket other than those required for the inspection.

### Be careful about noise

High level of noise around you can cause you to incur difficulty in hearing or to be deafened.

Be sure to use ear covers or plugs during engine service or the like which exposes you to noise for long period of time.

## II SAFETY

### Service work with engine running should be performed with 2 or more persons

For avoiding accident, do not perform service work with engine running. If inevitable, observe following:

- One person should stand at engine operating position on travel control panel side so that at anytime he can stop the engine, and always keep contacting each other.
- For working near any rotating part, use care because there is a risk of being caught.
- Do not touch control levers. If inevitable, be sure to give the partner a signal to let him or her evacuate from danger zone.
- Never touch a moving alternator drive belt or the like with your body or tool because it can result in amputation.



A0055210

### Care to be used when working underneath the machine

- Park the machine on level, hard ground with boom totally retracted and lowered.
- For performing service from underneath the machine, let the machine float with outrigger extended to maximum. If the machine is unstable and sways then, engage support under its front and rear for stabilization.



A0055140

**Care to be taken when working on the machine**

- For service work on the machine, tidy up your foothold for prevention of falling down and observe following:
  - Do not spill oil or grease.
  - Do not scatter tools around.
  - Watch your steps when walking.
- Do not jump off the machine.  
For mounting or de-mounting, use stool and support your body securely at three or more locations using your hand and foot (Both feet and hand or both hands and foot).
- Use protector adequate to your work.
- For prevention of downfall or stumbling by slipping, do not get on boom, outrigger or machinery cover.



A0305870

**Care to be taken while replenishing with fuel or oil**

- Fuel or oil may ignite when fire approaches it. Particularly light oil being in use, observe following:
- Stop engine while replenishing.
  - Do not smoke during replenishment.
  - Wipe off any spilled fuel or oil immediately.
  - Tighten fuel or oil cap securely.
  - Carry out fuel or oil replenishing work at well ventilated area.
  - Do not leave the spot during replenishment.



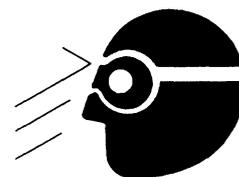
A0055020



A0055040

**Care to be taken during hammer work**

For hammer work, wear protector such as goggles or helmet and place brass drift or the like between object and the hammer.  
Giving impact to hard metal parts such as pin or bearing, may cause its chip to get in your eyes.



AE305880

## II SAFETY

### Care to be taken during welding repair work

Welding work should be performed at well equipped place by qualified person.

Welding work may cause generation of gas, fire or electrification. Non-qualified person should absolutely refrain from doing it.

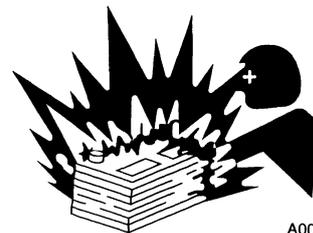
Qualified welding personnel should observe following:

- For prevention of battery explosion, disconnect battery terminal.
- Any paint on welding area should be removed for prevention of gas generation.
- Heating hydraulic equipment, piping or rubber hose or in its vicinity may cause inflammable gas or steam to ignite. Avoid heating such area.
- Heating pressurized piping or hose directly may cause them to suddenly break. Use fireproofing sheath.
- Wear protector.
- Make sure to have good ventilation.
- Stow away any inflammable object and have fire extinguisher ready.
- Do not place grounding wire in the vicinity of any electric component as it may cause trouble in the component.

### Removing battery terminal

For performing repair of electric system or welding work, disconnect negative terminal of the battery to stop electric current.

★ See Part III Operation 8. Handling of battery, for detail.



A0055170

### Care to be taken during rubber track tension adjustment

- Internals of rubber track tension adjust system is packed with grease, which is highly pressurized with track tension. Attempting to remove grease in negligence of following rules may cause the grease valve to blow off, resulting in serious accident.
- Tension adjusting grease valve should not be loosened by more than one turn. Grease valve may blow off otherwise.
- When adjusting the tension, do not position yourself directly in front of the valve to avoid the risk.
- ★ See Part IV Inspection and Service 8.4 [3] Rubber track tension inspection and adjustment.



A0055200

### High Pressure Hose: Use care

Leakage of oil from high pressure hoses may cause injury due to fire or malfunctioning of systems.

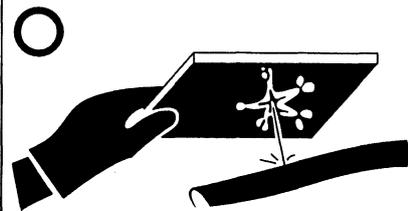
Whenever damage in hoses or loosened bolts are found, discontinue your work and contact your dealer for repair.

- For replacement of high pressure hoses, a skilled technician is required. Further, tightening torque has been established according to type and size of hoses. Do not perform repair work by yourself.
- When situation such as follows is found, replace the relevant parts:
  - Damage of or leakage at hose metal piece.
  - Sheath worn or broken or wire reinforcement layer exposed.
  - Partly expanded sheath
  - Sign of twist or collapse at moving part of hose
  - Foreign matter buried under sheath
  - Deformed hose metal piece.
- Replacement should be made with one hose at a time to avoid error.

### Care to be taken in connection with high pressure oil

When inspecting or replacing high pressure piping or hose, unless you make sure that the pressure has been released, serious accident may result. Strictly observe following:

- Do not proceed with inspection or replacement work before pressure is eliminated.
- Wear protection goggles and leather gloves.
- If there is a leakage in piping or hose, the area will be wet. Check for crack in piping and crack or expansion in hose. If it is difficult to identify, be sure to contact your dealer for repair.
- Leakage of high pressure oil from any small hole can hit you and cut your skin or make you blind. If you incur serious injury on your skin or in your eyes with high pressure oil, wash it off with water and see doctor promptly.

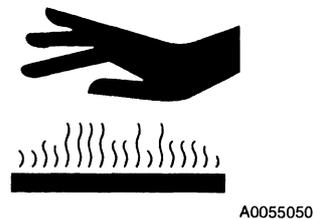


### Care to be taken in connection with high temperature

Immediately after engine is shutdown, engine, various oil, exhaust manifold and muffler remain hot.

Performing service work under such condition, including removing cap or replacing oil, water or filter will result in scalding. Wait for temperature to drop before proceeding with service in accordance with procedures shown in this manual such as follows:

- ★ Part IV Inspection and Service 8.5 Pre-operation inspection: for inspection of engine oil and hydraulic tank oil level check.
- ★ Part IV Inspection and Service 8.9 Service in every 500 hours: for engine oil replacement.
- ★ Part IV Inspection and Service 8.9 Service in every 500 hours: for Hydraulic return filter replacement.
- ★ Part IV Inspection and Service 8.10 Service in every 1000 hours: for Hydraulic tank oil and replacement.



### Checking to be performed after inspection and service

Failure to complete the required service items or failure to verify the function or actuation of serviced location, may cause unexpected trouble to occur, resulting in serious accident.

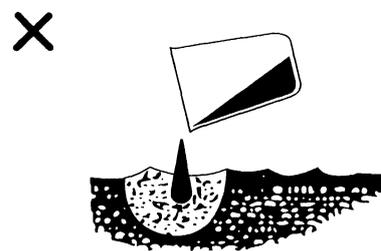
Observe following strictly:

- Checking after stopping engine:
  - Check for any neglected inspection and service location.
  - Check for proper execution of required inspection and service.
  - Check for tools or parts dropped. It is dangerous particularly if they are dropped internally or caught by link mechanism of levers.
  - Check for water leakage, oil leakage or bolt not tightened.
- Checking with engine running
  - For checking engine while it is running, see Paragraph "Service work with engine running should be performed with 2 or more persons" and pay sufficient attention for your safety.
  - Check the inspected and serviced location for normal actuation.
  - See if oil leakage does not occur when engine speed is increased and load is applied to hydraulic system.

### Care to be taken about waste treatment

In order to avoid polluting the environment of area where people and animals live, observe following strictly:

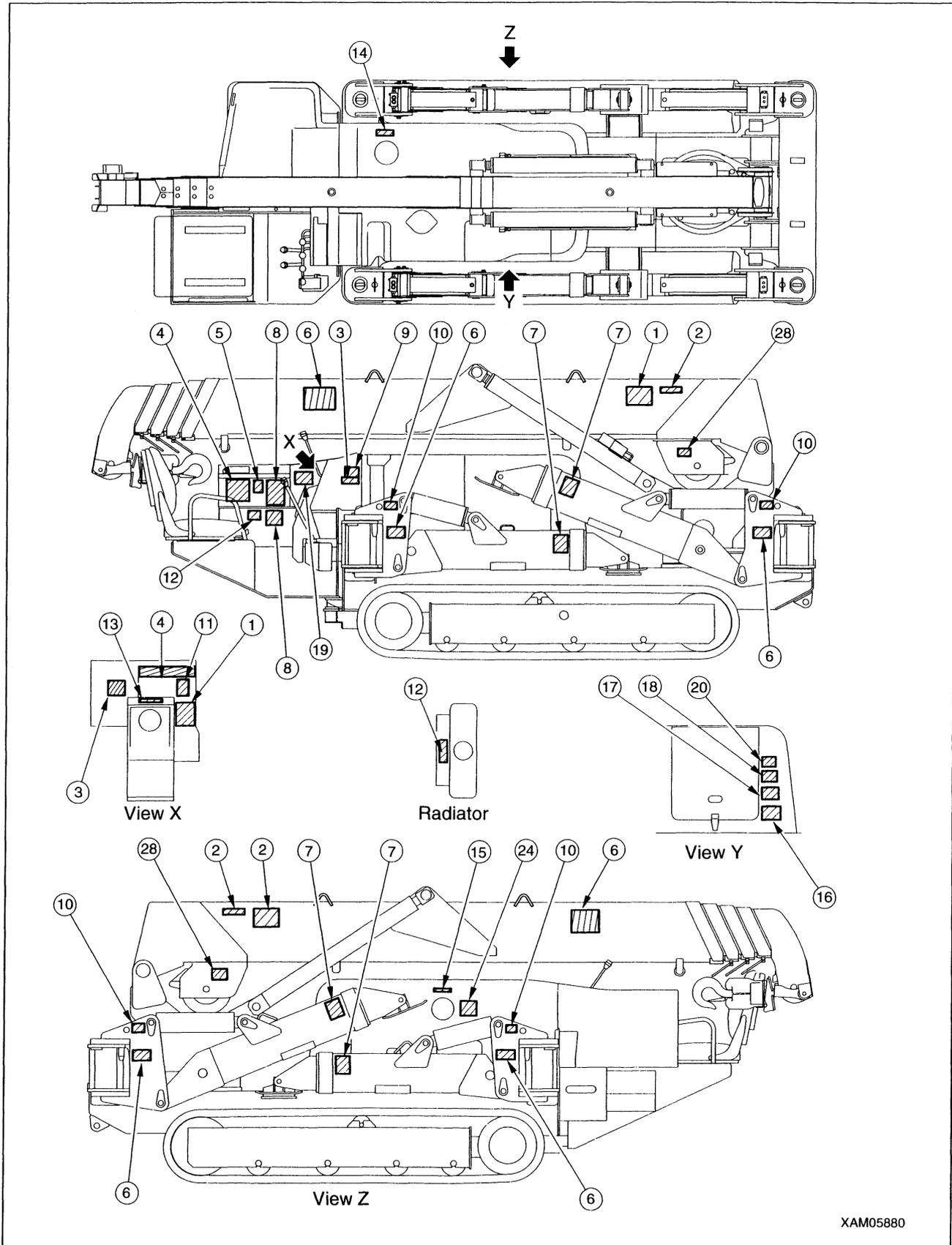
- Do not dispose waste oil to sewerage system or river.
- Be sure to dispose oil from machine to container. Do not dispose it directly to ground.
- For disposal of harmful matter including oil, fuel, solvent, filter and battery, observe applicable laws and regulations.



A0055220

## 6. Location for Affixing Caution Plates

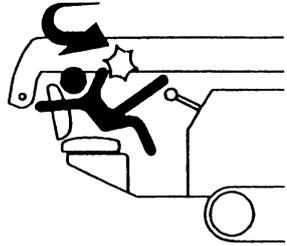
Keep these labels always clean. If it comes off, affix it again or replace with new one. There are other plates than those shown below. Take care of them in the same manner.



XAM05880

- ① CCW swing with boom lowered fully, prohibited (349-4420700)

**! DANGER**



**Counterclockwise swing prohibited with boom fully lowered.**

Whenever operator seat is manned, raise the boom to safe angle before making counterclockwise swing.

349-4420700

- ③ Machine weight display (349-4420900)

**MC-305C Total weight**

**3770kg**

349-4420900

- ② Minimum lifting capability (349-4420800)

**CM-305C**

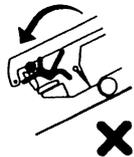
Load rating with maximum work radius and outriggers extended maximum.

**12.16 m × 250 kg**

349-4420800

- ④ Cautions for traveling on slope (349-4421100)

**! WARNING**



For traveling on slope or ramp boards, be sure to position your carrier so that its operator seat comes to higher end. Otherwise, should the carrier slips down, injury to the operator may result.



**Caution for traveling:**

1. When traveling, be sure to stow away outriggers as well as hook.
2. Be sure to slow down for making turn or traveling over bad road.
3. For standing or parking your carrier on slope, be sure to engage checks.

**! CAUTION**



Do not traverse or make turn on slope as it can result in tipping over. Make a detour to go around the slope for safety.

349-4421100

- ⑤ Caution on main switch (349-4421400)

**! CAUTION**



When finishing your work, be sure to turn the engine key switch to OFF position.

349-4421400

- ⑥ Caution on outrigger pin (349-4426900)

**! WARNING**



Do not insert your finger into the pin hole,

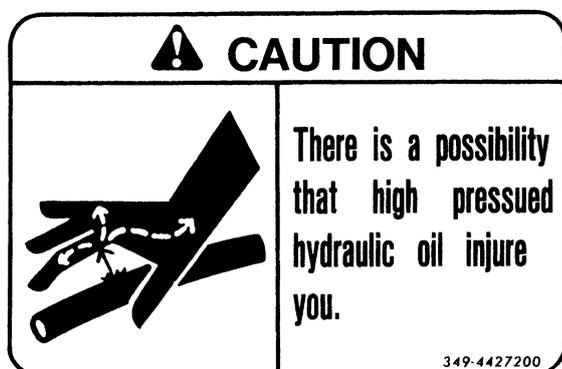
349-4426900

## II SAFETY

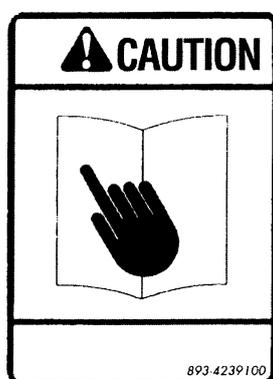
⑦ Safety for your feet (349-4427000)



⑨ Cautions for high pressure fluid (349-4427200)



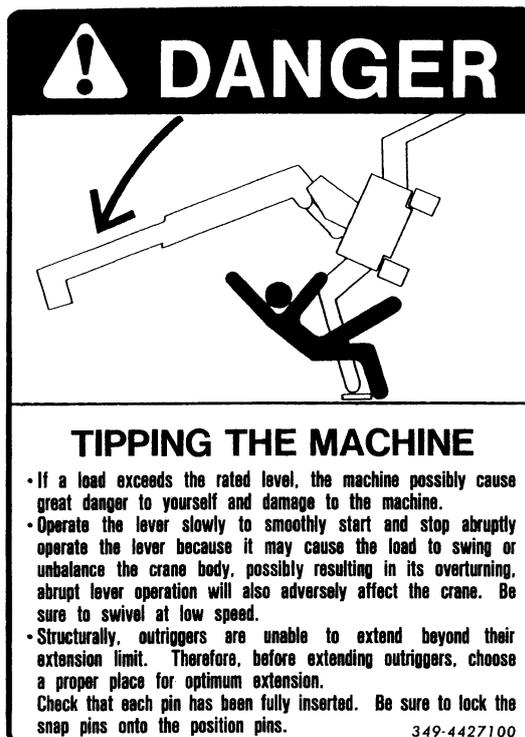
⑪ Notes for operation and services (893-4239100)



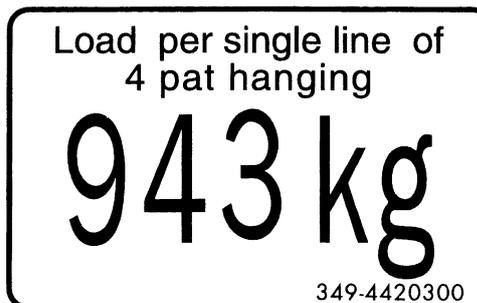
⑬ Warning on exhaust gas (349-4427400)



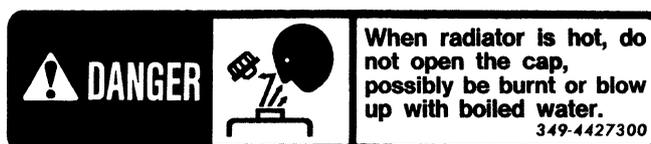
⑧ Warnings for crane tipping over (349-4427100)



⑩ (349-4420300)



⑫ Warning on radiator (349-4427300)



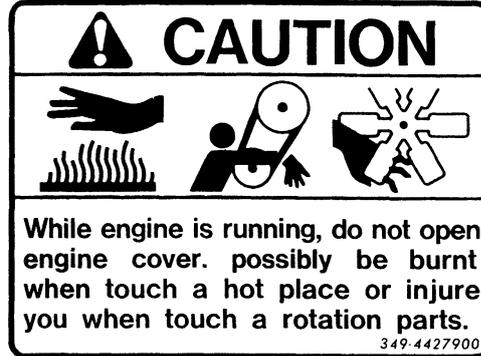
⑭ Fire strictly prohibited (349-4427500)



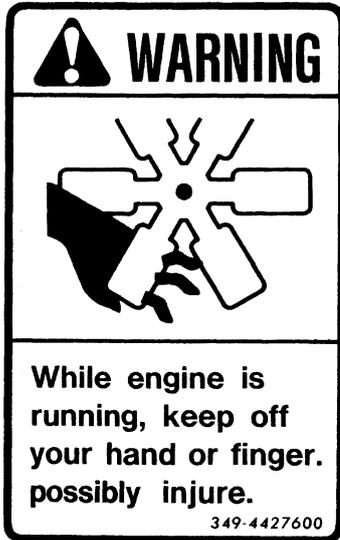
⑮ Warning on hot muffler (349-4427800)



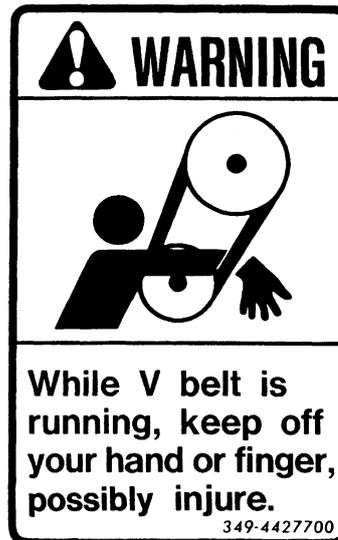
⑯ Cautions on engine cover (349-4427900)



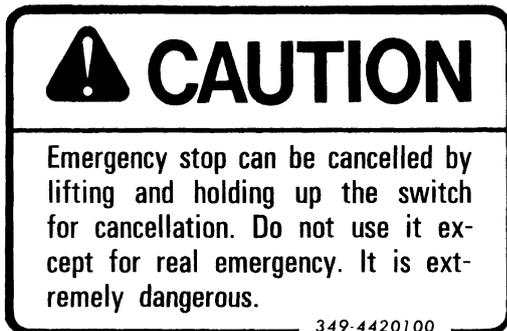
⑰ Cautions on rotating fan (349-4427600)



⑱ Cautions on rotating belt (349-4427700)



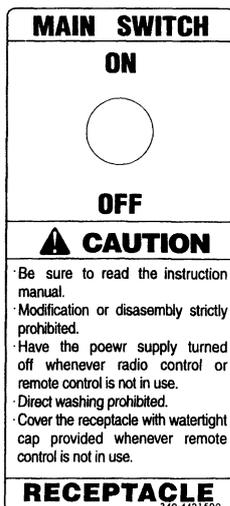
⑲ Caution/Emergency stop release (349-4420100)



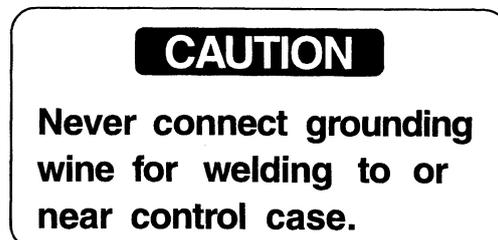
⑳ Warning for being caught (553-4267600)



㉑ Care / Receiver (349-4421500)



㉒ Welding earthing (300-4214200)



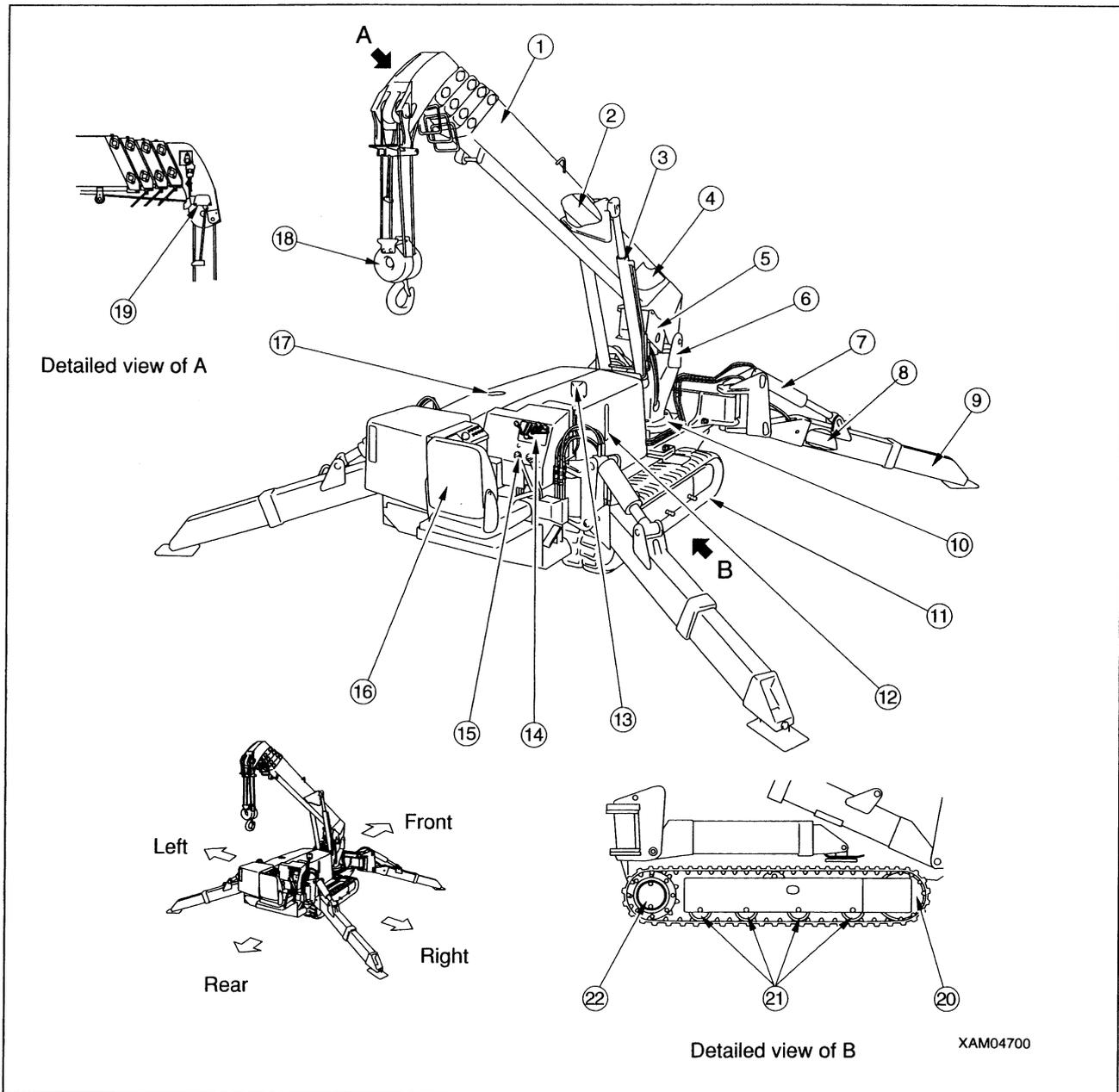


**Part III Operation**

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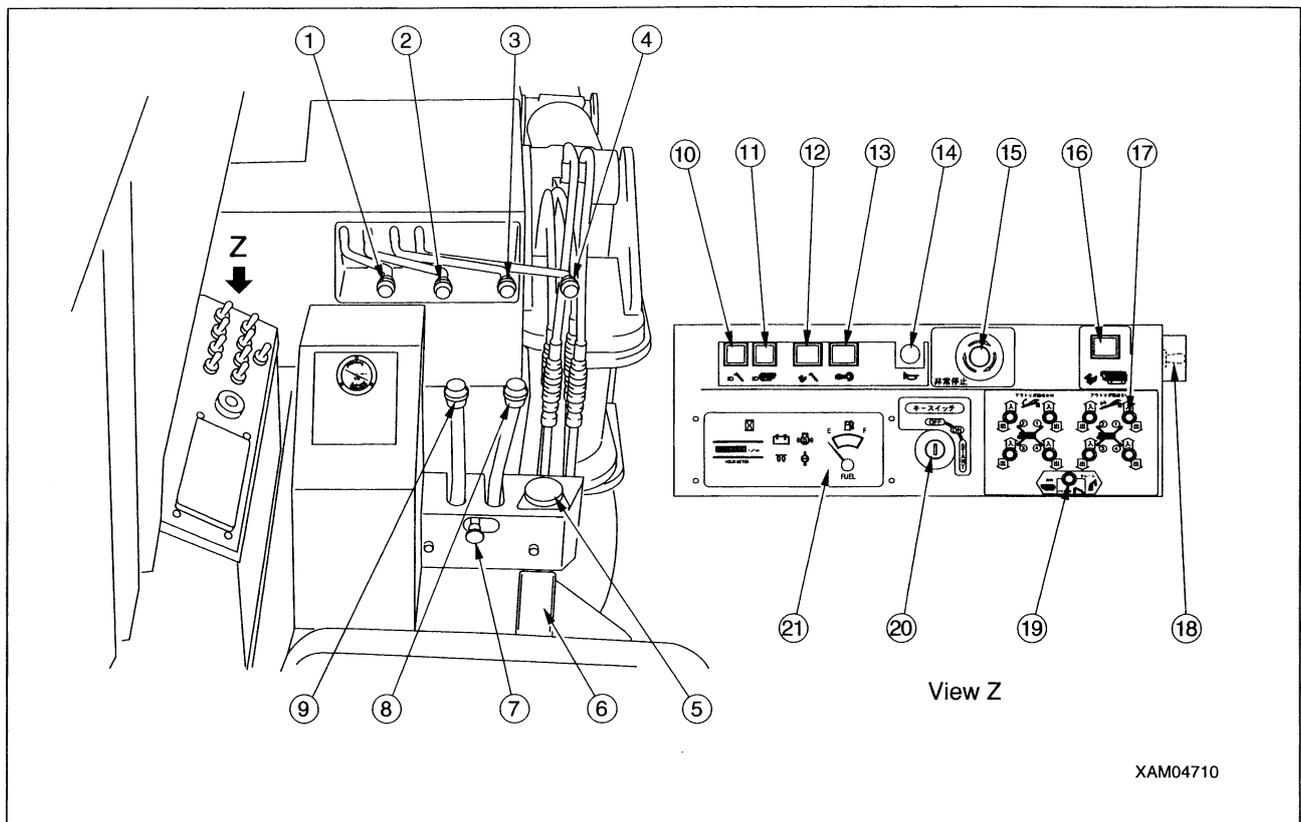
# 1. Nomenclature of Componentsts

## 1.1 Nomenclature of machine components



- |   |                                |
|---|--------------------------------|
| ① Boom  | ⑫ Hydraulic oil tank           |
| ② Boom telescoping cylinder (inside the boom)   | ⑬ Flood light (Rear)           |
| ③ Boom hoist cylinder                           | ⑭ Crane control                |
| ④ Load indicator                                | ⑮ Travel control               |
| ⑤ Winch   | ⑯ Seat                         |
| ⑥ Post  | ⑰ Fuel tank                    |
| ⑦ Outrigger setting cylinder                    | ⑱ Hook block                   |
| ⑧ Outrigger extension cylinder (inside the box) | ⑲ Over-hoist preventive device |
| ⑨ Outrigger                                     | ⑳ Front idler                  |
| ⑩ Post  | ㉑ Track roller                 |
| ⑪ Rubber track                                  | ㉒ Travel motor sprocket        |

## 1.2 Nomenclature of travel control components



XAM04710

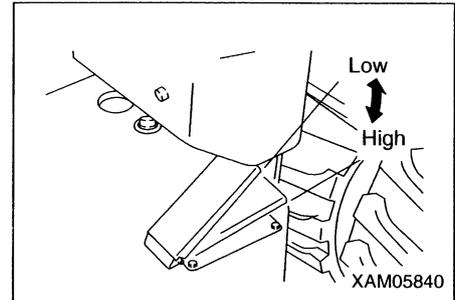
- |                              |   |
|------------------------------|---|
| ① Swing lever                | ⑫ Crane work high speed selector switch |
| ② Boom telescoping lever     | ⑬ Hook stowing switch                   |
| ③ Hook hoist lever           | ⑭ Horn switch                           |
| ④ Boom hoist lever           | ⑮ Emergency stop switch                 |
| ⑤ Level instrument           | ⑯ Travel high speed selector switch     |
| ⑥ Acceleration pedal         | ⑰ Outrigger control switch              |
| ⑦ Travel lock lever          | ⑱ Emergency stop cancel switch          |
| ⑧ Travel lever, right        | ⑲ Work selector switch                  |
| ⑨ Travel lever, left         | (travel, outrigger, crane work)         |
| ⑩ Flood light (Rear)         | ⑳ Starter switch                        |
| ⑪ Flood light switch (Front) | ㉑ Meter panel                           |

## 1.2.1 Control levers and pedals

### [1] Acceleration pedal

To be used for adjustment of engine speed or output

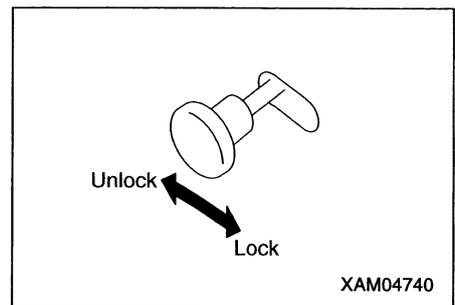
- Low idling: Take your foot off the pedal.
- Full rotation: Step on the pedal all the way.
  - ★ Perform your work with the pedal locked at such speed as is re-quired for your work.



### [2] Travel lock lever

To be used for locking the travel lever.

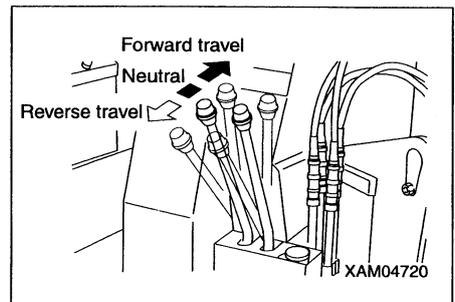
- Lock: Push the lever to right.
- Unlock: Push the lever to left.
  - ★ Travel lock lever should be operated only while the travel lever is in neutral.



### [3] Travel levers, left and right

Used for travelling forward/backward, stopping, swinging and adjusting travel speed.

- Forward travel: Push both of the left and right levers forward simultaneously.
- Neutral: Take your hands off both of the left and right levers simultaneously. Levers will return to neutral automatically, causing the machine to stop.
- Reverse travel: Pull back both of the left and right levers simultaneously.
- Left turn: Take your hand off the left lever.
- Right turn: Take your hand off the right lever.
- Spin turn: Move left and right levers respectively in opposite direction. Left and right tracks will respectively rotate in opposite direction to make the spin turn.



## 1.2.2 Switches

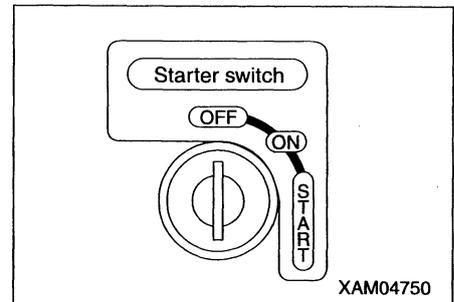
### [1] Starter switch

#### **⚠ CAUTION**

When you finish your work, be sure to turn the starter switch to OFF position.

Used for starting and stopping the engine.

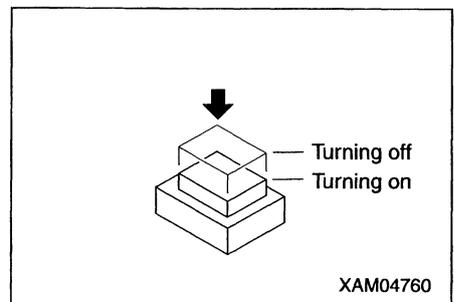
- OFF: At this position, key can be inserted or removed and switches of all the electric systems go off and engine comes to stop.
- ON: Power applied to electric circuit.
- Start: At this position, engine starts. Once the engine starts, take your hand off the key. The key will automatically return to ON position.



### [2] Front and rear flood light

Use for turning on the flood lights.

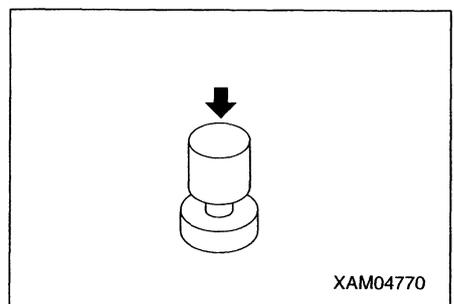
- Turning on: Press this switch.
- Turning off: Press the switch further. It will return to original position.
- ★ When the starter switch is in OFF position, flood light will not go on if the switch is pressed.
- ★ The flood light itself has a switch as well. Normally leave the switch on the flood light at its ON position.



### [3] Horn switch

Used to sound horn.

- To sound the horn: Press the switch.
- ★ Horn sound stops as you take your finger off the switch.

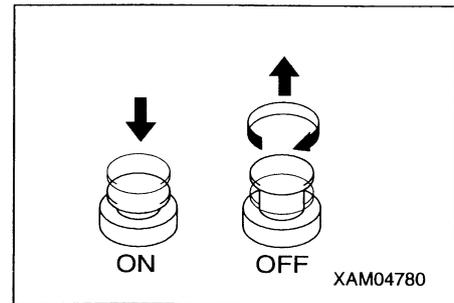


### III OPERATION

#### [4] Emergency engine stop

Use this switch to stop the engine with trouble having developed on the machine.

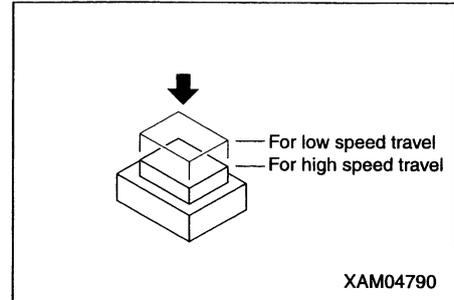
- Switch ON: Pressing the switch causes engine to stop.
- Switch OFF: Turn the switch to right. It will return to original position.



#### [5] Travel high speed selector switch

Use this switch to select travelling speed between high and low.

- For high speed travel: Press the switch.
- For low speed travel: Press the switch again. It will return to original position.



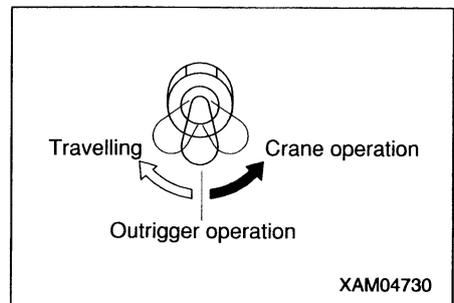
#### [6] Work selector switch (travel, outrigger and crane)

### ⚠ WARNING

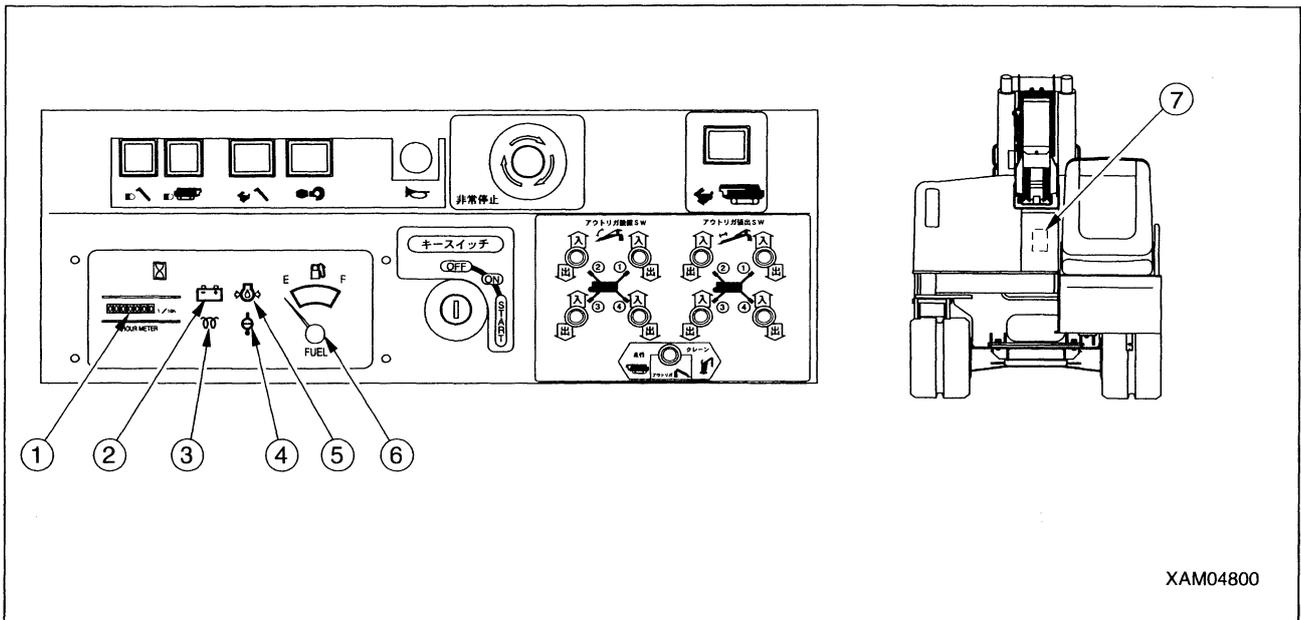
- Before setting this switch at Travel, be sure to stow the crane and let the machine assume Travel Position. Travelling without having the machine assume Travel Position may result in serious accident including tipping over of the crane.
- Before placing the work selector switch at [Crane], be sure to extend and ground all the outriggers. By operating the crane without extending and grounding all the outriggers, crane can tip over causing serious accident.

Used for selecting a function between travel, outrigger and crane operation.

- For travelling: Place the selector switch at left.
  - For outrigger operation: Place the selector switch in the center.
  - For crane operation: Place the selector switch at right.
- ★ When the work selector switch is in [Travel] position, only travelling function can be performed. When this switch is in [Travel] position, crane operation lever or outrigger control switch will not cause those action to be activated even if it is operated. Also, when it is in Travel position, radio control does not actuate outrigger or crane operation at all. For outrigger or crane operation, place the selector switch in those particular positions respectively.



### 1.2.3 Monitor



XAM04800

- ① Hour meter
- ② Charging monitor
- ③ Preheat monitor
- ④ Engine coolant temperature monitor
- ⑤ Engine oil temperature monitor
- ⑥ Fuel gauge
- ⑦ Fuse box (inside the cover)

## ⚠ CAUTION

When any monitor lamp blinks, check and adjust corresponding location as quickly as possible.

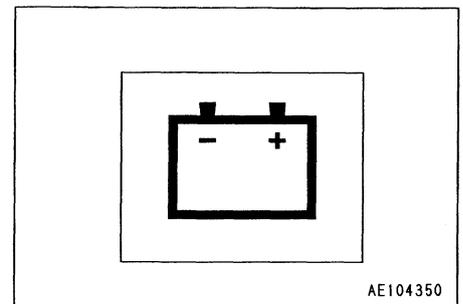
#### [1] Battery charge level monitor

This monitor lamp goes on if charging is not performed properly despite that the engine is running.

When it blinks, stop the engine and check V belt tension referring to Part IV Inspection and Service, 8.8 Checking and adjusting the alternator belt tension.

#### OUR ADVICE

This monitor lamp remains lit while starter switch is on but it goes off after engine is started.



AE104350

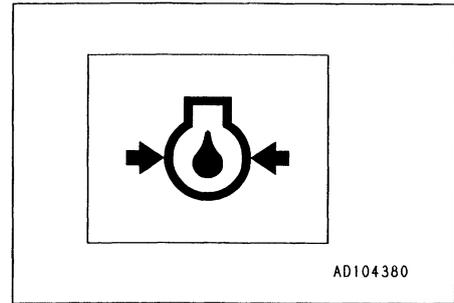
### III OPERATION

#### [2] Engine oil pressure monitor lamp

This monitor lamp blinks when the oil pressure drops below normal level. When it blinks, stop the engine and check the oil level in accordance with Part III Operation, 2.1.2 Checks prior to starting your work.

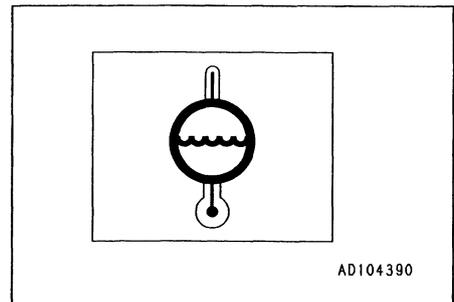
#### OUR ADVICE

It remains lit while starter switch is on but goes off after engine is started.



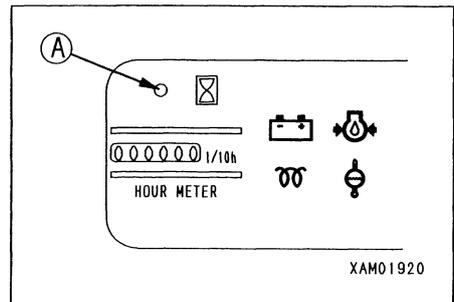
#### [3] Engine coolant temperature monitor lamp

This monitor lamp goes on when coolant temperature rises above normal level. If it comes on, run the engine at low idling speed and wait until it goes off (temperature goes down).



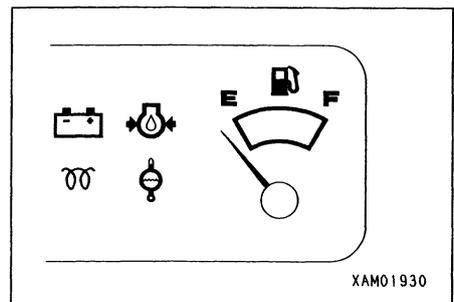
#### [4] Service meter

This meter indicates total hours the machine has been operated. Set up your servicing intervals accordingly. So long as the engine is running, the meter gains even while the machine is idle. While the engine is running, indicator lamp (A) above this meter goes on to indicate that the meter is gaining. Regardless of engine speed, the meter gains by the increment of one when it has run for an hour.



#### [5] Fuel gauge

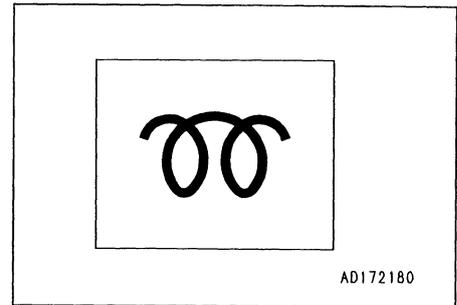
This gauge indicates fuel level in fuel tank. When the pointer approaches position E, replenish with fuel. There are cases where the pointer does not indicate proper level for a while after the starter switch is turned on, which is not any trouble.



**[6] Preheat monitor lamp**

This monitor lamp stays on while preheating the engine for start up.

It goes on when starter switch is placed at ON position and goes off in a few seconds to notify that preheating has completed.



**[7] Fuse**

**⚠ CAUTION**

Before checking or replacing fuses, be sure to place starter switch at OFF position.

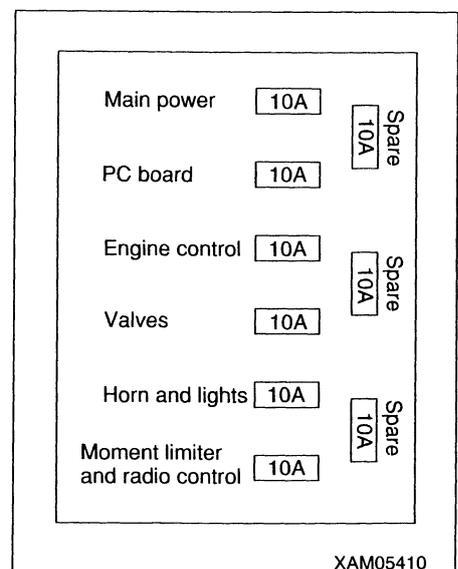
**OUR ADVICE**

Fuse protects electric components and wiring from burning.

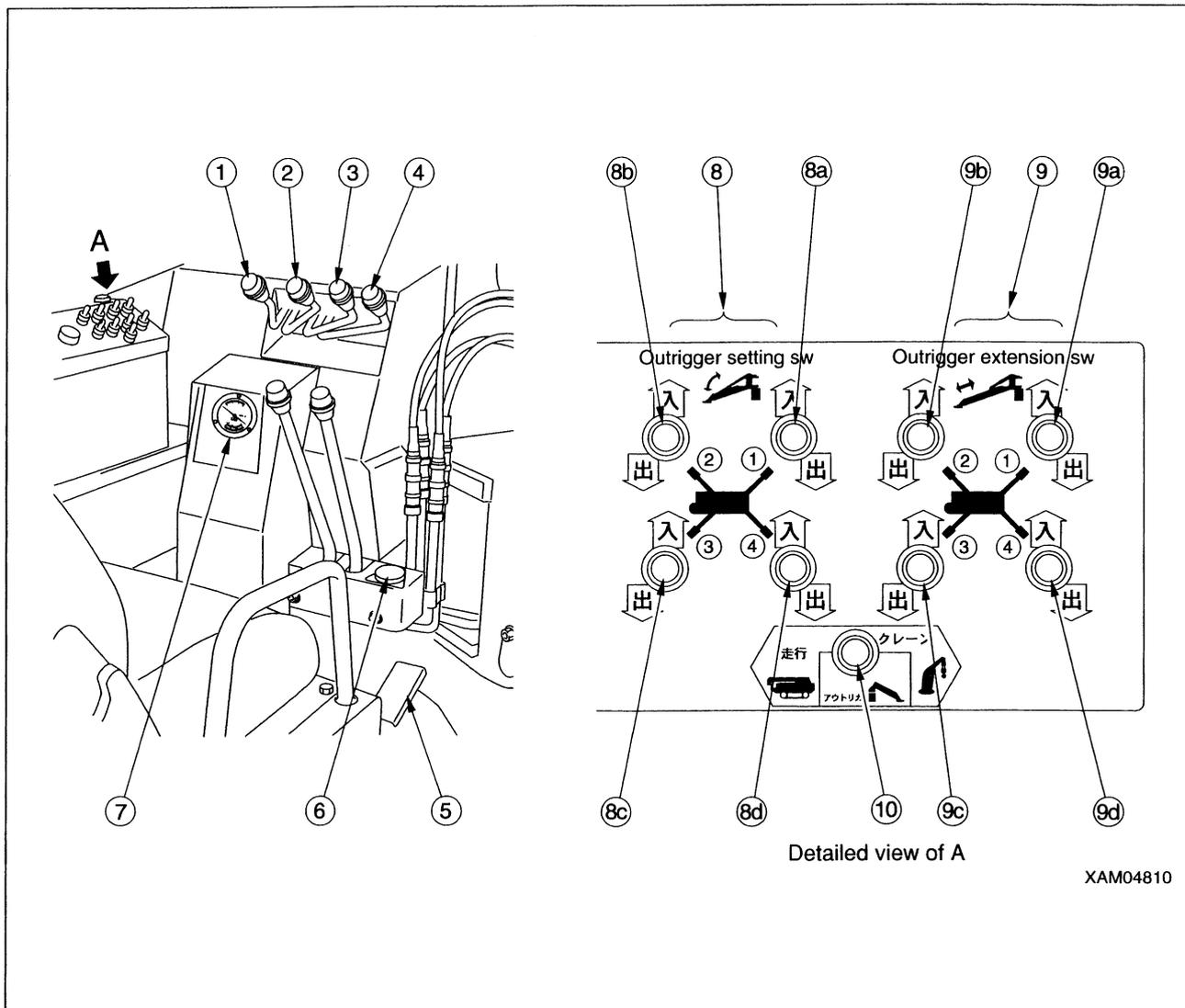
- Tubular type fuses are in use. Be sure to replace it when it is corroded with white powder deposited on it.
- When fuse is blown, check the circuit for cause and correct it before replacing the fuse.
- When replacing, be sure to use the tubular fuse of same capacity.

Fuse capacities and respective circuits

| Capacity | Circuits                         |
|----------|----------------------------------|
| 10A      | Main power                       |
| 10A      | PC board                         |
| 10A      | Engine control                   |
| 10A      | Valves                           |
| 10A      | Horn and lights                  |
| 10A      | Moment limiter and radio control |



### 1.3 Nomenclature of crane control components



XAM04810

- ① Swing lever
- ② Boom telescoping lever
- ③ Hook hoist and lowering lever
- ④ Boom hoist lever
- ⑤ Acceleration pedal
- ⑥ Level instrument
- ⑦ Load meter
- ⑧ Outrigger setting switches
  - a. Control switch for outrigger ①
  - b. Control switch for outrigger ②
  - c. Control switch for outrigger ③
  - d. Control switch for outrigger ④

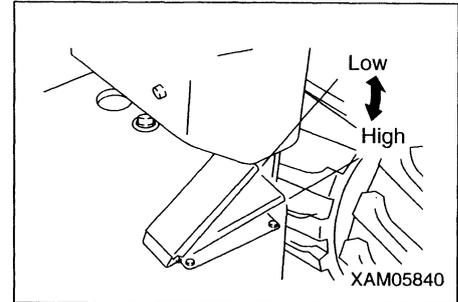
- ⑨ Outrigger extension switches
  - a. Control switch for outrigger ①
  - b. Control switch for outrigger ②
  - c. Control switch for outrigger ③
  - d. Control switch for outrigger ④
- ⑩ Work selector switch

### 1.3.1 Control levers

#### [1] Acceleration pedal

Used for adjustment of engine speed or output.

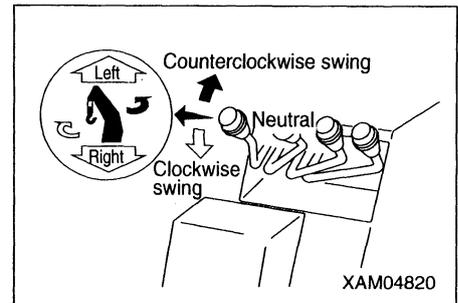
- Low idling: Take your foot off the pedal.
- Full rotation: Step on the pedal all the way.
- ★ Depress pedal to gain the engine speed required for work.



#### [2] Swing lever

Used for having boom post of the crane swing.

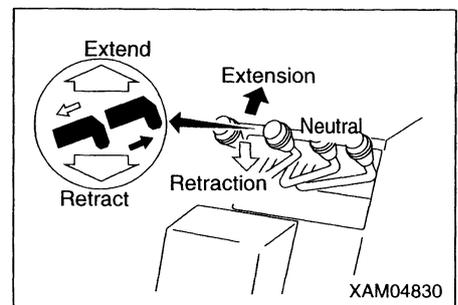
- Counterclockwise swing: Push the lever forward (to Left).
- Neutral: Take your hand off the lever, which will return to Neutral position, causing the swing to stop.
- Clockwise swing: Pull back the lever (to Right).



#### [3] Boom telescoping lever

Used for telescoping the boom.

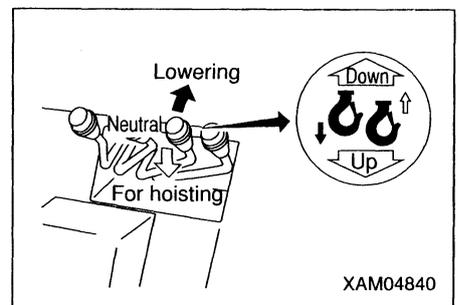
- Extension: Push the lever forward (to Extend).
- Neutral: Take your hand off the lever, which will return to Neutral position, causing the telescoping of the boom to stop.
- Retraction: Pull back the lever (to Retract).



#### [4] Hook hoist and lowering lever

Used for hoisting the hook of crane.

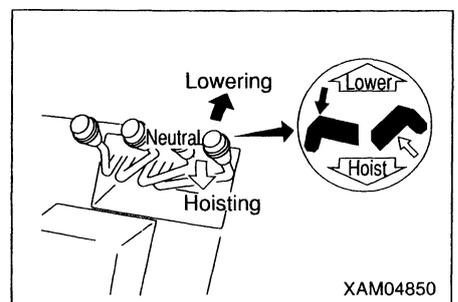
- Lowering: Push the lever forward (Down)
- Neutral: Take your hand off the lever, which will return to Neutral position, causing the brake to be automatically applied and hoisting and lowering of the hook block to stop.
- For hoisting: Pull back the lever (Up).



#### [5] Boom hoist lever

Used for hoisting the boom.

- Lowering: Push the lever forward (Lower).
- Neutral: Take your hand off the lever, which will return to Neutral causing the hoisting of boom to stop.
- Hoisting: Pull back the lever (Raise).

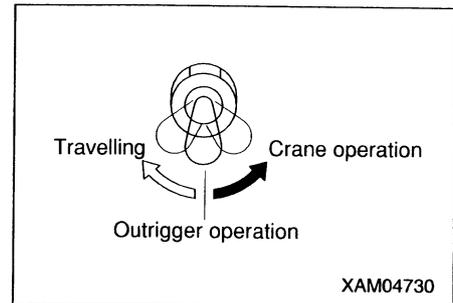


## 1.3.2 Switches

### [1] Work selector switch (travel, outrigger or crane work)

Used for switching among travel control, outrigger control and crane control.

- For controlling travel: Place the switch at left.
- For controlling outrigger: Place the switch in the center.
- For controlling crane: Place the switch at right.

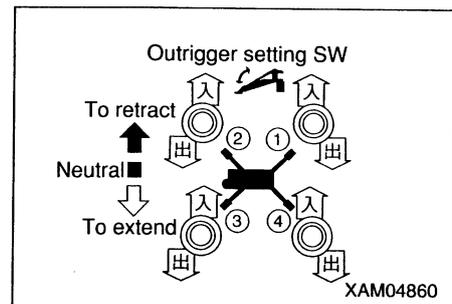


### [2] Outrigger setting switch

Used for setting and stowing away the outrigger.

This machine has 4 outriggers (①~④), which can be controlled individually or simultaneously.

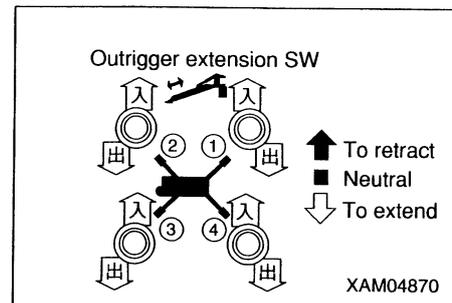
- To retract: Push the switch upward. Cylinder will be retracted and the outrigger will be stowed away.
- Neutral: Take your finger away from the switch, which will return to Neutral position and telescoping of the cylinder will discontinue.
- To extend: Push the switch downward. Cylinder will extend to allow the outrigger to be set up.



### [3] Outrigger extension switch

Used for extension and stowing of the outrigger. The machine has 4 outriggers (①~④), which can be controlled individually or simultaneously.

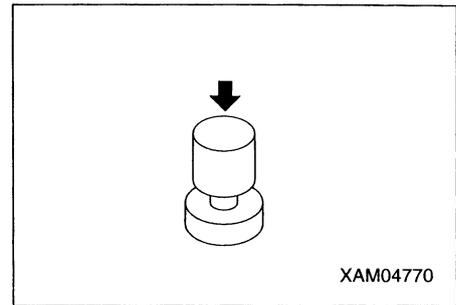
- To retract: Push the switch upward. The cylinder will retract so that inner box may be stowed away.
- For Neutral: Take your finger off the switch. The switch will return to Neutral position and telescoping of the cylinder will discontinue.
- To extend: Push the switch downward. The cylinder will be extended so that outrigger is extended as well.



**[4] Horn switch**

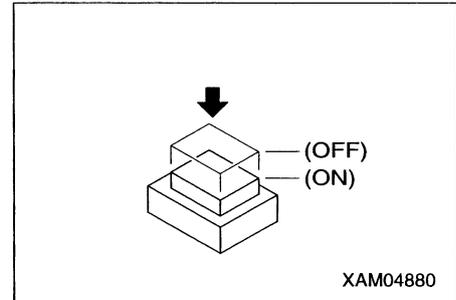
Used to sound the horn.

- To sound the horn: Press the switch.
- ★ The horn will discontinue to sound when you take your finger off the switch.



**[5] Crane high speed select switch**

- Switch ON: Press down the switch from released position in order to close the switch and increase work speed.
- Switch OFF: Press down the switch again, to open the switch and return to normal working speed.



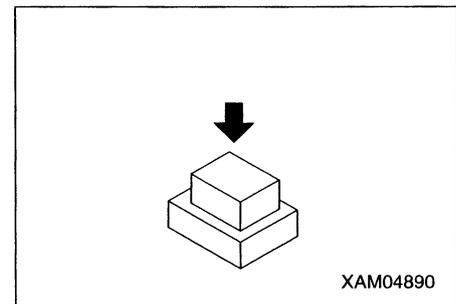
**[6] Hook stowing switch**

**⚠ WARNING**

**Restrict the use of this switch for stowing the hook only.**

Use this switch to stow the hook.

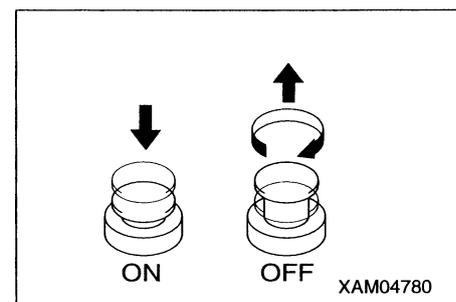
- For stowing the hook, hook hoisting operation causes over-hoist preventive device to be actuated and automatic stop to be applied. To prevent it, keep this switch pressed and such hoisting can continue. Taking your finger off the switch causes over-hoist preventive device to return to valid.



**[7] Emergency stop switch**

Use this switch to stop engine with a trouble having developed.

- Switch ON: Pushing the switch causes engine to come to stop.
- Switch OFF: Turning the switch clockwise causes the switch to return to original position.



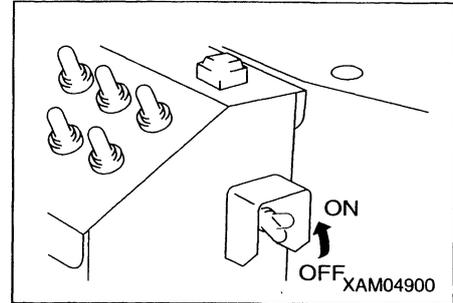
#### [8] Emergency stop cancel switch

#### **⚠ WARNING**

**Do not use this switch during work as tipping over or over-hoisting may result.**

Used for canceling automatic stopping function of moment limiter as required during inspection, service or maintenance work.

- **Switch ON for canceling:** While the switch is pushed upward, moment limiter function is cancelled.
- **Switch OFF for auto-stop:** Taking your finger off the switch causes the switch to return to original position and moment limiter function is be actuated.



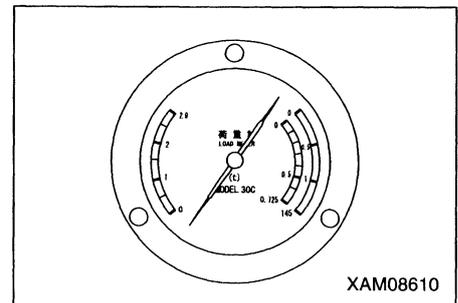
### 1.3.3 Meters and lamps

#### [1] Load meter

#### ⚠ WARNING

- Load meter indicates the mass (weight) of load being hoisted with winch. Hoisting any load in excess of rated load of the crane can cause tipping over or other damage. Crane work should always be carried out while making sure that the pointer of this meter remains within safety range.
- Failure of the load meter jeopardizes safe crane operation. Load meter should be always kept in normal conditions with monthly inspection carried out independently.

It indicates the mass (weight) of the load being hoisted with winch. Scales of the load meter are provided for one, two and four part reeving according to number of wire rope part reeving of the hook. Read the scale that corresponds to your number of part reeving. Standard for this machine is 4 part reeving.



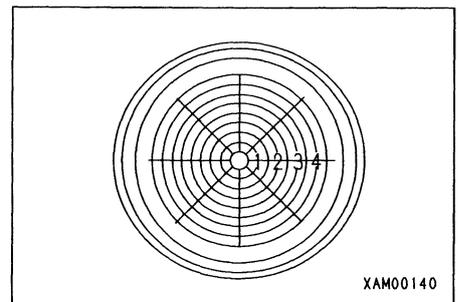
XAM08610

#### [2] Leveling instrument

#### ⚠ WARNING

For setting up outrigger, adjust the level of machine while checking it by means of leveling instrument. Performing crane work with the machine inclined, may result in tipping over.

It indicates inclination of the machine. Position of bubble tells the inclination of machine and its direction. Used for checking the levelness of machine when setting up outrigger. When the bubble comes to the center, the machine is level.



XAM00140

#### 1.4 Over-hoist preventive device

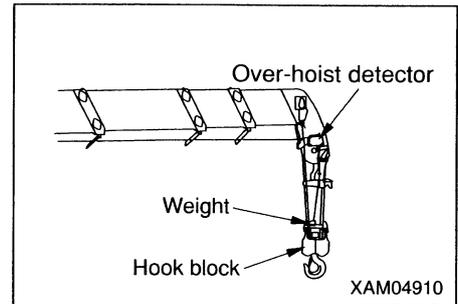
When you hoist the hook or extend the boom to such extent that the hook lifts the weight on the over-hoist preventive device wire rope, the buzzer will sound intermittently to notify the operator.

Simultaneously, motion of the hook hoisting and boom extension stops.

When it happens, reset the system promptly.

#### OUR ADVICE

When you hoist, pay attention to the clearance between the hook and boom. Extending the boom causes the hook to be hoisted. Always extend your boom while watching the hook height.



#### Resetting from the automatic stop:

Lower the hook with the action of either hook lowering or boom retraction.

## 1.5 Machinery cover

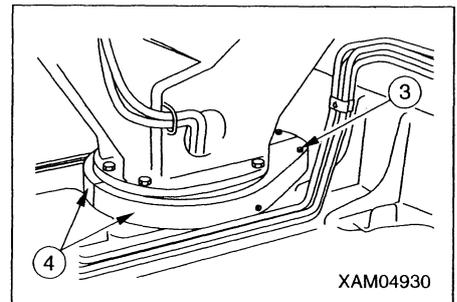
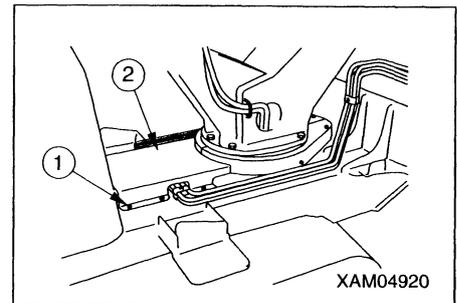
### **⚠ WARNING**

- Before removing machinery cover, be sure to shutdown engine and remove key switch.
- Do not remove the machinery cover while engine is still hot, such as immediately after completion of work.

### [1] Removing the machinery cover

For inspecting and servicing inside the machinery cover, remove the cover in the following manner:

1. Remove top cover mounting bolts ① (x6).
2. Remove the center cover ②.
  - ★ Unless the center cover ② is removed, bottom mounting bolt ③ (x1) can not be removed.
3. Remove machinery cover mounting bolts ③ (x5).
4. Remove machinery covers ④, right and left.



### [2] Reinstallation of the machinery cover

Upon completion of inspection and service for inside the machinery cover, re-install center cover and machinery cover with above procedure reversed.

## 2. Operation Control

### 2.1 Inspection prior to starting up the engine

#### 2.1.1 Visual check

### ⚠ WARNING

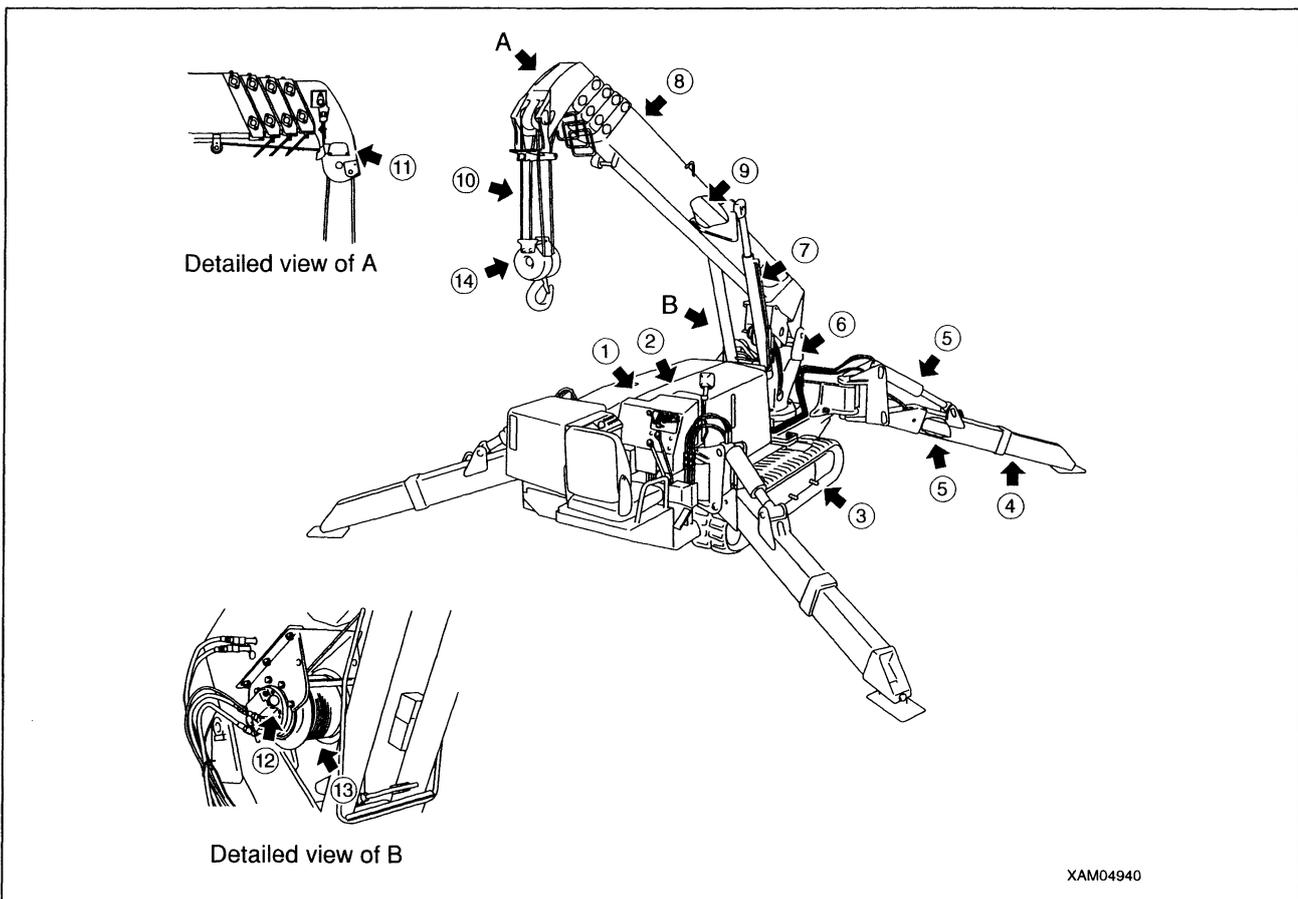
- This machine has a diesel engine installed. If you smell fuel around the engine, it is possible that it is leaking. Thoroughly check fuel hose for any crack and its connections for tightness.
- Deposit of inflammable matter or oil leakage around high temperature zone including engine, muffler or battery may cause fire on the machine. Conduct visual inspection carefully and be sure to correct any abnormality or contact your dealer.

Before starting up the engine, check around the engine for smell of fuel.

Inspect externals and bottom of the machine to check for loosened bolt and oil leakage, in addition to checking the crane and hydraulic systems.

Check for looseness or play in electric wiring and deposit of trash in places where it is exposed to high temperature.

Inspections described in this section should be conducted before the first engine start-up of the day.



**① Inspection around engine**

Check for and remove accumulation or deposit of inflammable items including fallen leaves, wastepaper, trash, oil or grease on high temperature area such as engine and muffler.

Check for fuel or oil leakage from engine and correct it as necessary.

Check for slackened wiring or loosened connection or trace of burning around starter, alternator or battery and correct any abnormality that may be found.

**② Inspection of hydraulic system of undercarriage (travel motor, control valve, hydraulic oil tank, hose joint)**

Check for loosened pipe connection or oil leakage and correct any abnormality.

**③ Inspection of undercarriage (rubber track, track roller, sprocket and idler)**

Check for damage, wear, loosened track roller and correct any abnormality. Check for loosened or missing bolt and retighten as necessary.

★ See Part III Operation, 3. Handling of rubber track for detail.

**④ Inspection of outrigger**

Check for crack, bend, damage, wear of support pin or the like and repair as necessary.

**⑤ Inspection of Outrigger cylinder**

Check for loosened pipe connection, oil leakage, wear or damage of support pin or the like and repair it as necessary.

**⑥ Inspection of post**

Check for crack, bend, damage in various area, loosened post and slew ring mounting bolts, loosened slew system speed reducer mounting bolt, loosened pipe connections or oil leakage thereof and correct any abnormality detected.

**⑦ Inspection of boom hoist cylinder**

Check for loosened pipe connection, oil leakage, wear or damage of support pin or the like and repair it as necessary.

**⑧ Inspection of boom**

Check for crack, bend, damage in various area, wear of support pin or the like and repair it as necessary.

**⑨ Inspection of boom telescoping cylinder**

Check for loosened pipe connection or oil leakage and correct any abnormality that may be found.

### III OPERATION

#### ⑩ Inspection of wire rope

Check for damage, deformation, wear, twist, kink and corrosion and replace where necessary.

★ See Pat III 4. Handling of wire rope for detail.

#### ⑪ Inspection of over-hoist preventive device

Check the wire rope of over-hoist weight for damage or the like and replace it as necessary.

#### ⑫ Inspection of winch motor

Check for loosened pipe connection, oil leakage or loosened mounting or the like and repair it as necessary.

#### ⑬ Inspection of winch drum

Check the drum for crack, bend, damage or the like and repair it as necessary. Check hoisting wire rope for disorderly take-up and correct it as necessary

#### ⑭ Inspection of hook block

Check hook and sheaves for crack, bend, damage or the like and repair where necessary. Check hook and sheaves for proper rotation and correct it as necessary.

## 2.1.2 Inspection before starting your work

Inspections described in this section should be conducted before the first engine start-up of the day.

### [1] Checking the coolant level and replenishing

#### **⚠ WARNING**

**Do not remove radiator cap unless required. Coolant check should be performed at sub-tank ①, while engine is cool.**

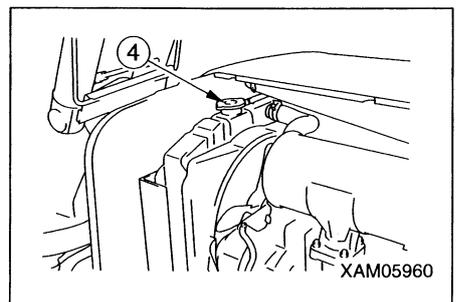
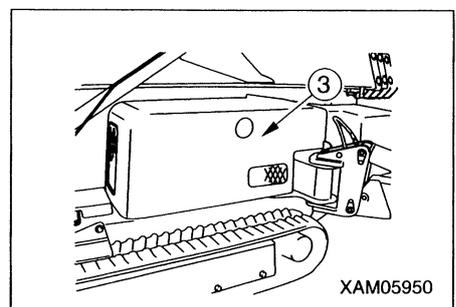
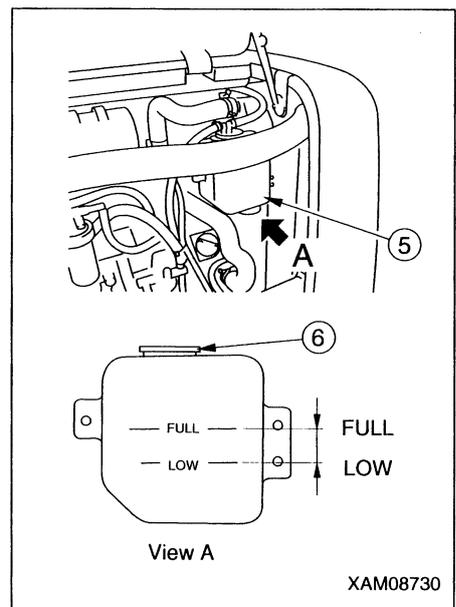
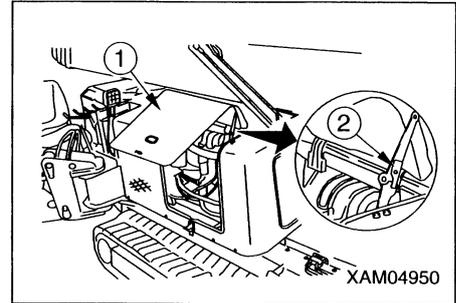
1. Pull back the knob, open the engine hood ① and slide the stay lock ② to lock the hood securely.

2. Check to see that coolant level is between FULL and LOW of sub-tank ⑤ (sketch to the right) and if insufficient, replenish through filler port ⑥ of the sub-tank to the FULL mark.

3. After replenishment, tighten the cap securely.

4. If the sub-tank is found empty, check for leakage and check the coolant level in radiator. If insufficient, with the cover ③ and cap ④ removed, refill the radiator before filling the sub-tank.

5. Replace cover ③ and engine hood ① with the removing procedure reversed.



#### [2] Engine oil level check and replenishment

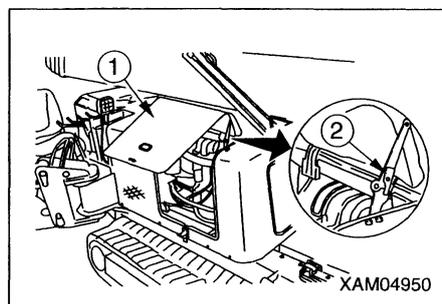
## ⚠ CAUTION

After oil level check and replenishment, install oil level gauge properly to prevent the gauge from falling off during operation, which may cause scalding due to shooting hot oil.

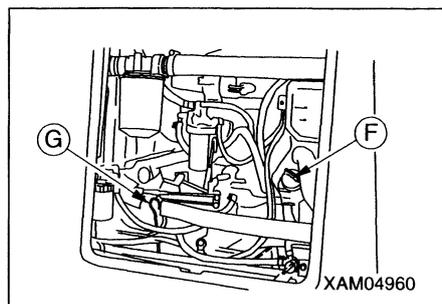
### OUR ADVICE

- As for the oil to be used, see Part IV Inspection and Service, 5.1 Application of lubricant in accordance with ambient temperature. Use of oil which is not recommended, may shorten the service life of your engine. Be sure to replenish with recommended oil.
- Level of engine oil should be maintained properly. Excessive feed of oil may lead to its increased consumption or its pre-matured deterioration as its temperature is prone to rise. Insufficient oil on the other hand may cause seizure in engine.

1. Park the machine on level ground.
2. Pull back the knob, open the engine hood ① and slide the stay lock ② to lock the hood securely.
3. Pull out oil level gauge ③ and wipe off any oil with waste cloth.

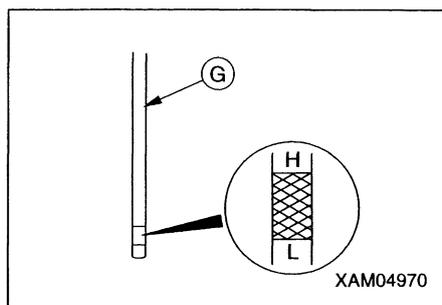


4. Insert the gauge into filler port and pull out it again.
5. Oil level is proper if it is between the markings H and L on the gauge rod ④.
6. If oil does not reach the "L" mark, replenish with oil through filler port ⑤.



- ★ Oil should be replenished to midway between the markings H and L on level gauge rod ④.

7. After replenishment, re-install gauge rod ④ and filler port cap ⑤ securely.
8. Close the engine hood ① with the procedure reversed.

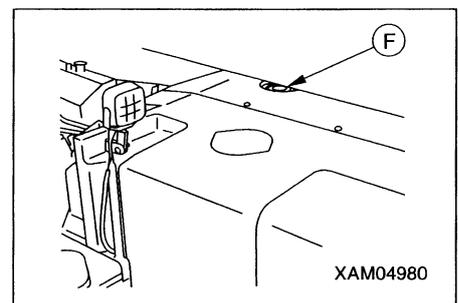
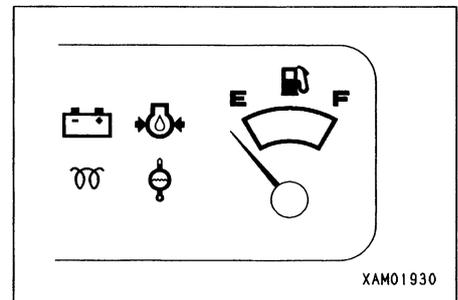


## [3] Fuel level check and replenishment

**⚠ DANGER**

- As for the fuel to be used, see Part IV Inspection and Service, 5.1 Application of lubricant in accordance with ambient temperature.
- Be careful about fire including that of lit cigarette.
- For replenishment of fuel, be sure to shutdown the engine. Feeding fuel with engine running, may cause inflammation due to spilled fuel on heated muffler.
- Excessive feed of fuel is dangerous as it may cause spilling. Stay on the slightly lower side of specified maximum level. Any spilled fuel should be wiped off thoroughly.
- After replenishment, close the tank cap securely.

1. Turn the engine key to ON position and check the fuel gauge on monitor panel to see that the tank is full (Close to F mark).
  2. If insufficient, take the cap (F) off the tank top and replenish with fuel through filler port while watching the fuel gauge.
  3. After replenishment, turn the tank cap (F) to close it securely.
- ★ After a day's work, be sure to fill the tank with fuel.

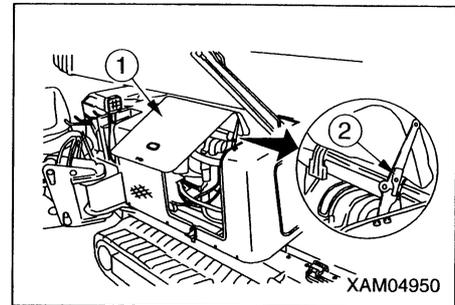


#### [4] Inspection and cleaning of water separator

##### OUR ADVICE

Water or trash which remains in the water separator may constitute a cause for engine trouble. Check the pot internals and remove them as necessary.

1. Pull back the knob to open engine hood ① and slide the stay lock ② to lock it securely.



2. Inspect water separator pot ⑤ to see that any water or trash does not remain in it.

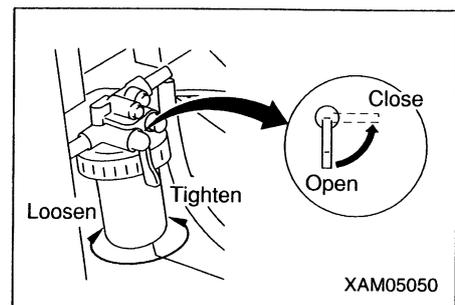
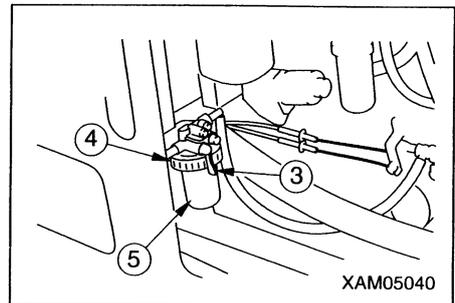
3. If there is any water or trash remaining inside the water separator pot, clean its internals in the following manner:

(1) Turn fuel lever ③ to horizontal position (Close) to stop flow of fuel.

(2) Loosen retainer ring ④ by rotating it counterclockwise and remove water separator pot ⑤.

(3) Cleanse the water separator pot ⑤ with light oil, before blowing its internals with compressed air (0.20~0.29Mpa or 2~3kgf/cm<sup>2</sup>) to remove surface dust.

(4) After reinstalling the water separator pot ⑤, turn the fuel lever ③ to vertical position (Open)



4. Close the engine hood with the procedure reversed.

[5] Inspection and cleaning of fuel filter pot

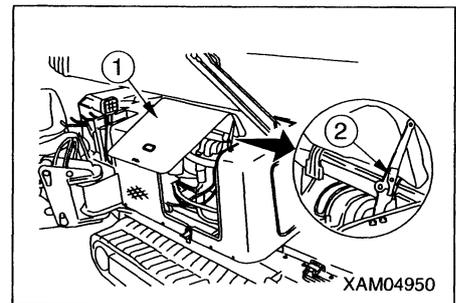
**⚠ WARNING**

- Filter pot contains fuel (light oil). When you clean it, be careful about fire including lit cigarette.
- If fuel is spilled, be sure to wipe it off.

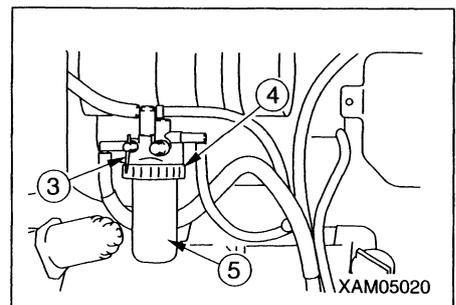
**OUR ADVICE**

Water or trash remaining in the filter pot constitutes a cause for engine trouble. Check the filter pot internals and remove them.

1. Open engine hood ① and lock it securely by sliding the stay lock ②.

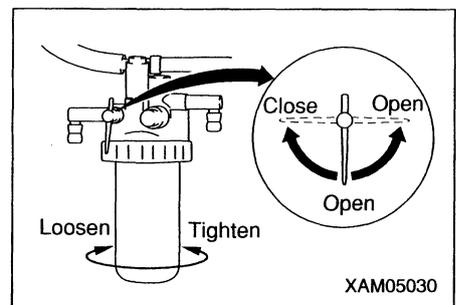


2. Inspect the filter pot ⑤ to make sure water or trash does not remain in the pot or that the element is not clogged with trash.



3. If water or trash remains within the filter pot, clean the pot in the following manner:

- (1) Turn the fuel lever ③ to horizontal position (close) to stop flow of fuel.
- (2) Loosen retainer ring ④ by turning it counterclockwise and remove filter pot ⑤ and element.
- (3) Cleanse the water separator pot ⑤ and element with light oil, before blowing its internals with compressed air (0.20~0.29Mpa or 2~3kgf/cm<sup>2</sup>) to remove surface dust.
- (4) After reinstallation of the filter pot ⑤ and element, return the fuel lever ③ to vertical position (open).



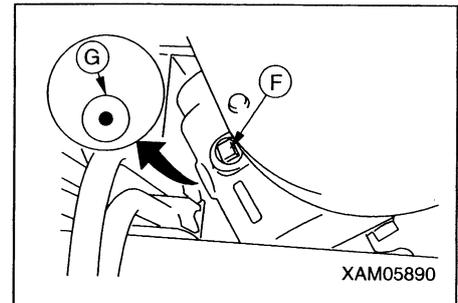
4. Close the engine hood ① with the procedure reversed.

#### [6] Inspection of oil level in slew gear box case and replenishment

##### OUR ADVICE

- For the oil to be used, see Part IV Inspection and Service, 5.1 Application of lubricant in accordance with ambient temperature.
- After the check and replenishment of oil, take measures against oil leakage by winding seal tape around threaded portion of level check plug and filler port plug, before tightening them securely.

1. Inspect the slew speed reducer case fluid level checking sight gauge (G) to make sure that the level is up to its center.
2. If insufficient, feed gear oil through the filler port (F).
  - ★ Fill to the center of the sight gauge (G).
3. After replenishment, tighten the level check plug (F) securely.

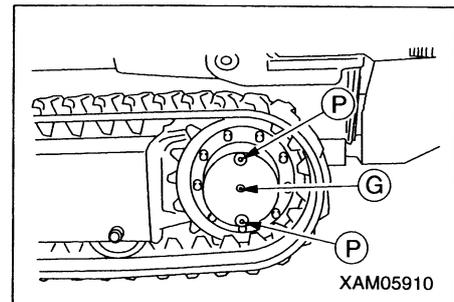


#### [7] Inspection of oil level in final drive case and replenishment

##### OUR ADVICE

- For the oil to be used, see Part IV Inspection and Service, 5.1 Application of lubricant in accordance with ambient temperature.
- After the check and replenishment of oil, take measures against oil leakage by winding seal tape around threaded portion of level check plug, before tightening them securely.

1. Move the machine back and forth so that drain plug (P) of final drive case comes to the bottom.
2. With oil check plug (G) of final drive case removed, check that oil comes out of the plug hole.
3. If insufficient, feed gear oil through the hole for level check plug (P).
  - ★ Feed the oil until it flows out of the oil level check plug (G) hole.
4. After replenishment, tighten the oil level check plug (G) securely.



## [8] Inspection of level in hydraulic oil tank and replenishment

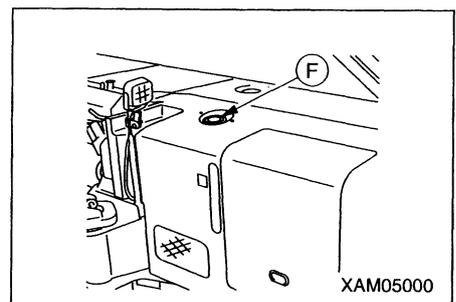
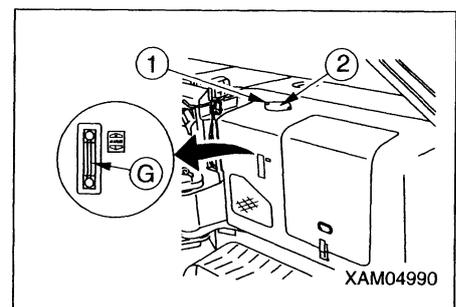
**⚠ WARNING**

- There can be a case where removing the hydraulic oil tank cap causes the oil to shoot. Rotate the cap slowly to have internal pressure escape, before removing it.
- After replenishment with oil, close the tank cap securely. If not it may come off during operation and scalding may be incurred due to shooting hot oil.

**OUR ADVICE**

- For the oil to be used, see Part IV Inspection and Service, 5.1 Application of lubricant in accordance with ambient temperature.
- Before checking oil level, be sure to let the machine assume Travel Position. Checking the oil level with the machine in working position, may cause excessive replenishment because oil in each cylinder may not have returned to tank.
- Do not let the oil level exceed the level point of gauge ⑥.

1. Check the oil level gauge ⑥ at the right side of engine cover to see the oil level is between markings H and L.
2. If insufficient, remove cover ② with mounting bolts ① (x2) removed. Remove tank cap ⑦ from tank top and replenish with hydraulic oil through filler port while watching the gauge ⑥.
3. After replenishment, close the tank cap ⑦ securely, before reinstalling the cover ②.

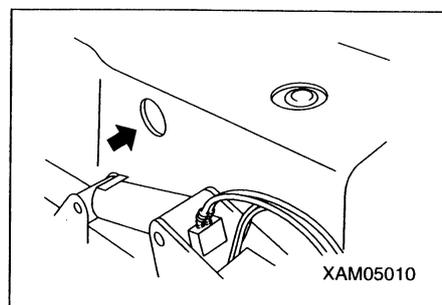


#### [9] Inspection and cleaning of engine exhaust hole

##### **⚠ WARNING**

Deposit of wastepaper, straw trash, fallen leaves at engine exhaust hole may constitute a cause for fire. Be sure to check and clean the hole.

Inspect engine exhaust hole for deposit of wastepaper, straw trash or fallen leaves. Remove them as necessary.



#### [10] Inspecting the electric wiring:

##### **⚠ WARNING**

- In case fuse blows frequently or trace of wiring short circuiting is found, be sure to locate the cause and correct.
- Deposit of dead leaves, branches or grass around the battery should be removed because it may become a cause of fire.
- Keep the top surface of battery clean and check the vent in the battery caps. If clogged with dirt or the like, remove them by washing the caps with water.

Check fuses for damage and proper capacity, wiring for breakage or trace of short circuiting and terminal for tightness. Retighten as necessary.

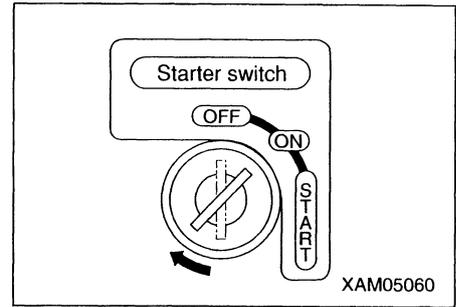
In particular, wiring for battery, starter and alternator should be checked.

Check around the battery for deposit of inflammables and remove them.

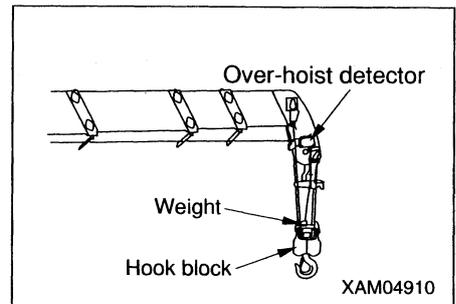
For trouble shooting and correction, contact your dealer.

**[11] Inspection of horn and over-hoist preventive device**

1. Insert key to starter switch and turn it to ON. Then, conduct following inspections:

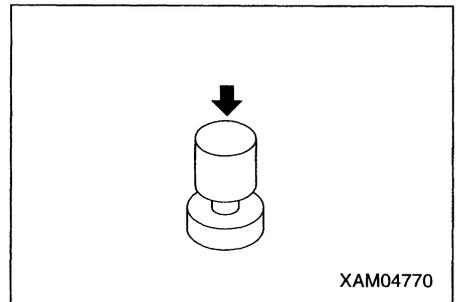


2. With the hook block over-hoisted, perform the action of winch hoisting and boom extension respectively. Make sure that either of such action causes the horn to sound or, unless speaker volume is nullified, message "Hook is being over-hoisted" will sound and hoisting or extending motion has been disabled. If this does not happen, deficiency of over-hoist preventive device is conceivable.



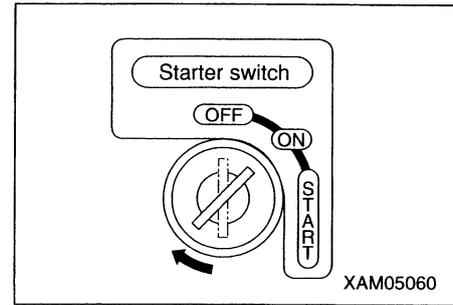
In case the warning buzzer does not stop sounding, trouble in the over-hoist system is conceivable. Contact your dealer for the repair.

3. Press the horn switch and make sure that horn sounds. If not, trouble in the horn or its wiring failure is conceivable. Contact your dealer for repair.



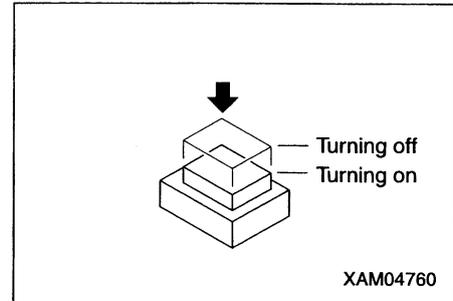
#### [12] Inspection of flood light

1. Insert key to starter switch and turn it to ON position.



2. Press front and rear flood light switch to see the flood lights for machine front and at operator seat front go on. If it does not, blown bulb or wiring failure is conceivable. Contact your dealer for service.

★ Switch is provided on the flood light itself as well. This switch also should be turned ON.



#### [13] Checking the boom and frame for crack, deformation or other damage

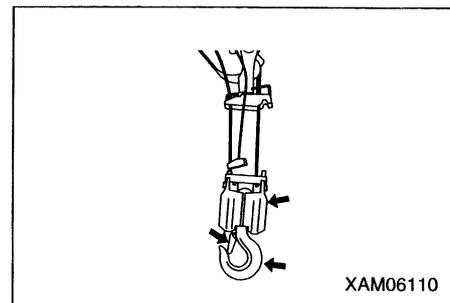
Check the boom and frame for crack, deformation or other damage and correct any defect.

#### [14] Checking the wire ropes for deformation, damage or wear

Inspect the rope end, take-up condition on the drum and the contact between ropes. See Part III 4. Handling of Wire Ropes for details of check and inspection of wire rope during hoisting and boom extension.

#### [15] Checking the Winch and Boom for proper functioning

1. Make sure that each action of winch hoisting/lowering and boom hoisting, lowering, extension and swinging coincides with the positions of each operating lever.
2. While checking the function of preceding subparagraph, check for abnormal noise arising from various part of crane including boom and hydraulic motor.
3. By operating the crane with no load, check for any loosened or missing bolt or nut.
4. Inspect the hook for deformation, abnormal noise from bearings and proper function of wire rope retainer.



## [16] Operator seat adjustment

**⚠ WARNING**

- Make adjustment before starting operation or when operator has been replaced.
- Adjust the seat so that, with operator's back resting on the back of the seat, the operator can step on the acceleration pedal sufficiently.

**1. Longitudinal adjustment of the seat**

Move the lever ① to left and set the seat as desired before taking your hand off the lever.

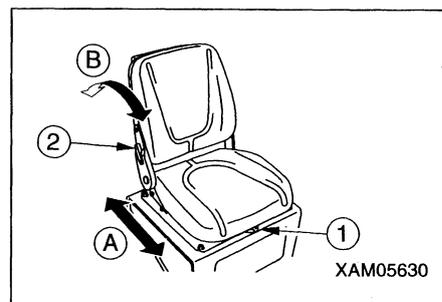
Amount of longitudinal adjustment (A): 120 mm (in 6 steps)

**2. Adjustment of reclining angle****OUR ADVICE**

When reclining the seat back further, watch out for the space in the back.

Pull up the lever ② and adjust appropriately before taking your hand off the lever.

Adjustable angle (B): 75 degrees (7 position forward and 23 position backward)



## 2.2 Starting up the engine

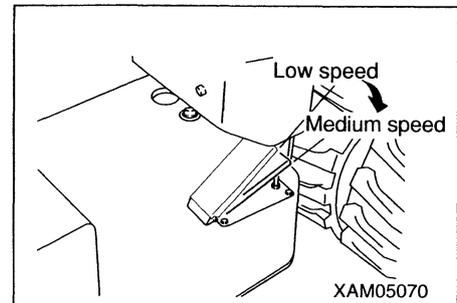
### ⚠ WARNING

Before starting up your engine, make sure that there is no person or obstacle around and sound horn.

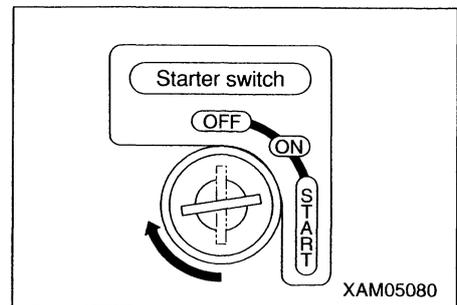
### OUR ADVICE

- Do not keep the starter turning for more than 5 seconds. It accelerates discharge of battery. If the engine fails to start, wait for about 2 minutes before attempting again.
- Before starting up the engine, make sure that fuel lever of fuel filter pot is in vertical (Open) position.
- Make sure that main switch on radio control box is in OFF position.

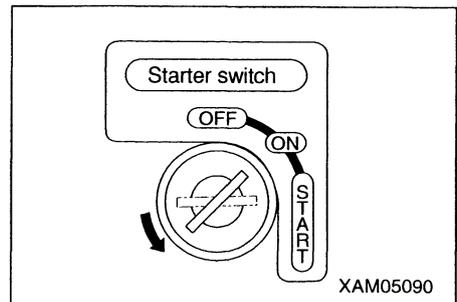
1. Step on acceleration pedal lightly.



2. Insert key to starter switch before turning it to Start position.



3. Once engine has started, take your hand off the key, which will return to ON position automatically.



## 2.3 Operation and checking after engine has started

### **⚠ DANGER**

Never replenish with fuel (light oil) with engine running.  
Be sure to stop the engine for refueling.

### **⚠ WARNING**

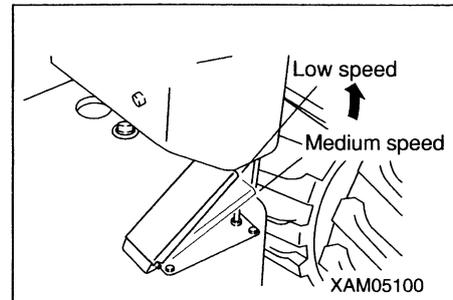
- If any trouble develops during warm-up run, promptly turn the starter key to OFF position for an emergency stop. Engine will stop and power for electric system will go off.
- Make sure to conduct warm-up run. Particularly in cold climate, sufficient warm-up run is essential. Without it, reaction to control lever by travel or crane system will be slow, leading to serious accident.
- After warm-up run, be sure to check actuation of crane function. While doing so, use care to avoid interference or collision between hook block and boom.
- When swinging the boom, use care that it does not hit operator.
- If any abnormality should be detected during these functional check, promptly make the emergence stop for required repair. Operating the crane with abnormality remaining may lead to serious accident.

#### OUR ADVICE

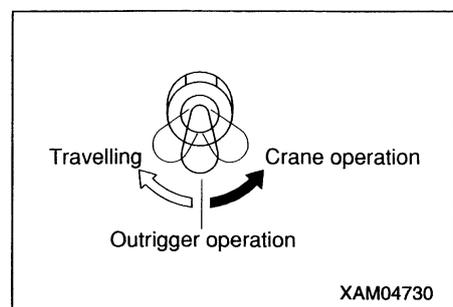
- It is appropriate that hydraulic oil is used in the temperature range of 50 to 80°C. Even when you have to work in low temperature, at least the oil temperature should be raised to 20°C before starting your work.
- Do not race the engine in haste until warm-up run is completed.
- After engine has started, check that battery charge lamp has gone off. If not, correct the situation.
- Do not run the engine either at low idling or high idling speed for more than 20 minutes. If idling is required, either apply load occasionally or run it at medium speed. When you use engine at low speed, race the engine once a day for about 5 minutes.

Once the engine starts, perform warm-up run in the following manner:

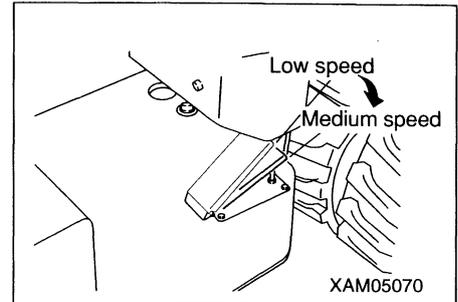
1. Take your foot off the acceleration pedal and with the engine running at low speed, continue its no-load run for about 5 minutes.
2. Check for abnormal exhaust color, sound or vibration of the engine and correct it as necessary.



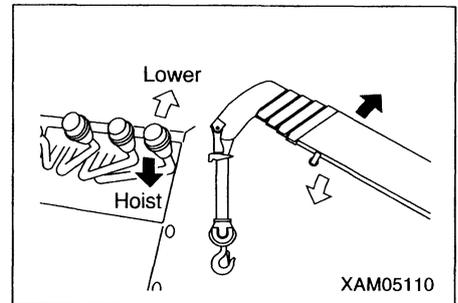
3. Place work selector switch at Outrigger.
4. Set up the outrigger.
  - ★ See Part III Operation, 2.12 Setting up the outrigger for detail.
5. Operate winch lever downward to Lower position and loosen the hook block slightly from locked position.
  - ★ See Part III Operation 2.14 Procedure before starting crane work for detail.



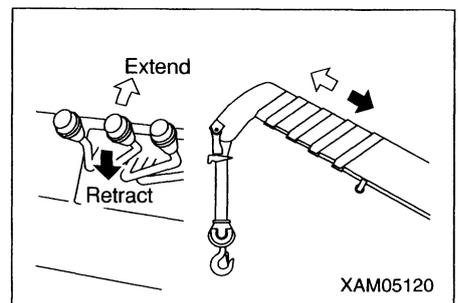
6. Step on the accelerator pedal (to about half the stroke) so that engine runs at medium speed.



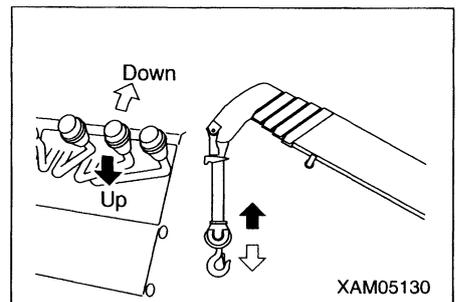
7. Slowly operate the boom hoist lever back and forth so that hoist cylinder extends and retracts to its stroke end to check that its function is normal. If not, correct it as necessary.



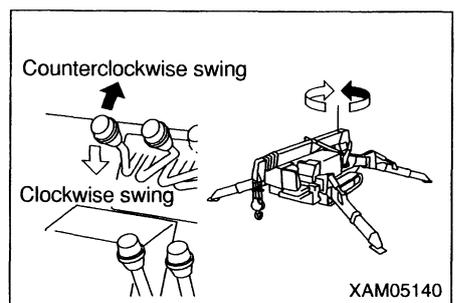
8. Slowly operate boom telescoping cylinder back and forth so that the boom extends or retracts to its stroke end to check that its function is normal. If not, correct it as necessary.



9. Slowly operate winch lever back and forth to check that hook block is hoisted and lowered smoothly, that it stops immediately when the winch lever is returned to Neutral position and that the winch does not take up the rope in disorderly manner. Correct any abnormality as necessary.



10. Slowly operate slew lever back and forth to check that the crane swings clockwise and counterclockwise smoothly more than 360 degrees respectively and that it stops immediately when the swing lever is returned to Neutral. Correct any abnormality as necessary.



### 2.4 Break-in operation

#### **⚠ WARNING**

**Perform break-in operation with this machine during the first 250 hours on service meter. Overloading the machine before various part of machine adapts to operation, may shorten its useful life.**

While this machine is shipped after having gone through sufficient adjustment and inspection, forcible operation during early stage of usage invites pre-matured deterioration in engine or crane performance, resulting in their shortened useful life. It should undergo break-in operation for the first 250 hours or so on service meter. During the break-in period, observe following rules in particular:

- After starting up the engine, be sure to perform warm-up run and avoid racing it in accordance with Part III Operation, 2.3 Operation and check after starting up the engine.
- Avoid working while overloading it or at high speed.
- Avoid rapid start, rapid acceleration, unnecessary sudden stop or rapid change of travelling direction.
- When break-in period reaches 250 hours, be sure to change engine oil in accordance with Part III Operation 8.3 [1] Engine oil replacement. Metal particles due to adaptation of engine internals increase within engine oil to deteriorate the engine oil and shorten the useful life of the engine.

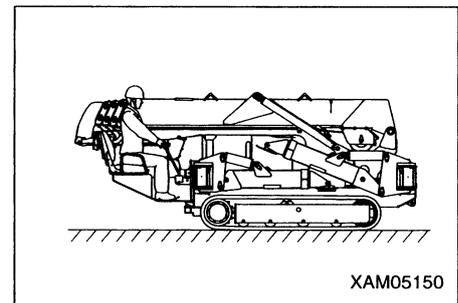
## 2.5 Travel position of the machine

### **⚠ WARNING**

- To move this machine by self-travelling, let the machine assume Travel Position with boom, hook block and outrigger stowed.
- Travelling with boom extended or with a load suspended, is prohibited. It may cause tipping over and serious accident including injury or death.
- Do not use this machine for other than its primary purpose, such as carrying package placed on it.
- As for driving this machine on public road, see local regulation.

When moving this machine, let it assume travel position as shown in sketch to the right.

1. Stow the crane and lock the hook block at prescribed location.
  - ★ See Part III Operation, 2.22 Stowing the crane for detail.
2. Stow away all the outriggers.
  - ★ See Part III Operation, 2.23 Stowing the outrigger for detail.

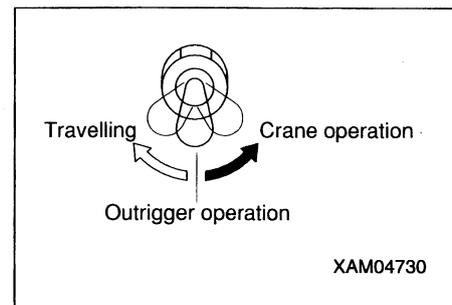


XAM05150

## 2.6 Starting the machine

### ⚠ WARNING

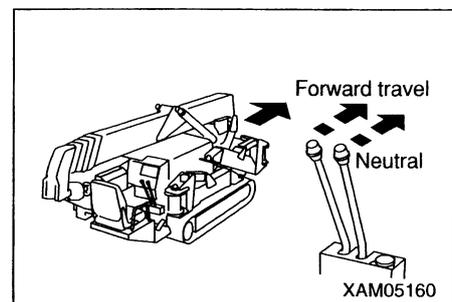
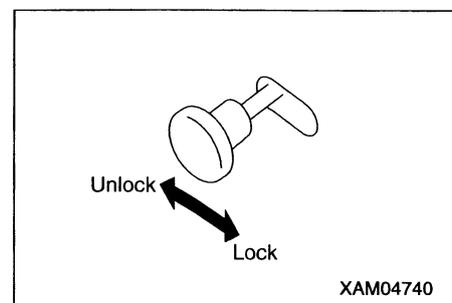
- Do not allow any person to approach the machine.
- Remove any obstacle in its travelling path.
- Before starting the machine, make sure of the safety around it and sound the horn.
- Immediate front of the machine will become a blind spot. Pay special attention when travelling forward.
- In case your travelling direction is in blind spot and you can not make certain of the safety, stop the machine once and check for the safety before continuing to travel. Place a guide, depending on the job site situation.
- While travelling, work selector switch should be placed in Travel position and travel lever locking lever in Free position.



### [1] Forward travel

Operate travel levers, right and left, simultaneously.

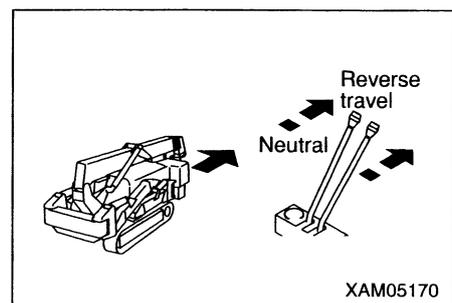
- Slowly push the right and left travel levers forward to start.



### [2] Backward travel

Operate the travel levers, right and left, simultaneously.

- Slowly pull back the right and left travel levers to start.



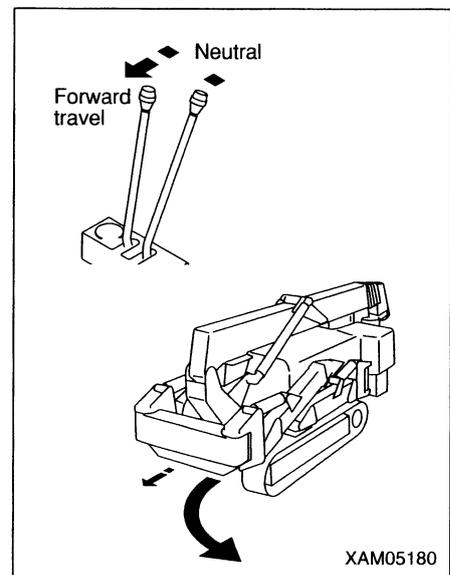
## 2.7 Changing travel direction of the machine

### ⚠ WARNING

- Rapidly changing travel direction at high speed or unnecessary spin turn not only damages rubber track or hydraulic system, but may cause collision with other object. Before making a spin turn, bring the machine to a complete stop and adjust engine to low speed.
- Changing travel direction on slope should be avoided as it is likely to cause side skidding. Be extra careful over soft or clay ground.

### [1] Changing direction of the machine while it is standing still:

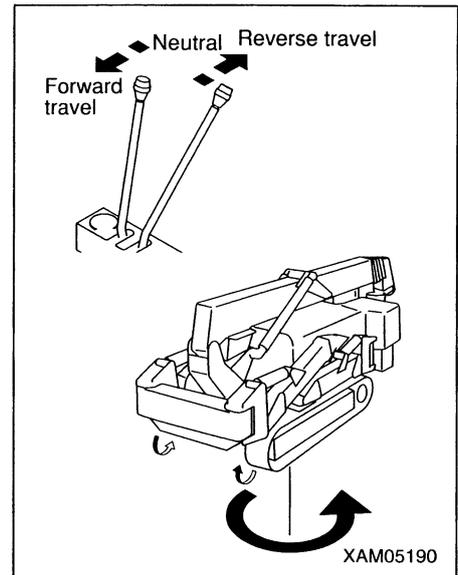
- For making left turn:  
Operate the travel lever on your right hand side.  
Pushing it forward causes the machine to turn left in the direction of travelling forward.  
Pulling it back causes the machine to turn left in the direction of travelling backward.
- For making right turn:  
Operate the travel lever on your left hand side.  
Pushing it forward causes the machine to turn right in the direction of travelling forward.  
Pulling it back causes the machine to turn right in the direction of travelling backward.



### III OPERATION

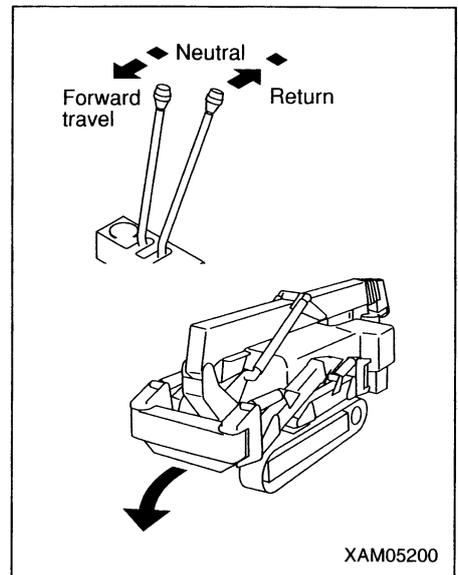
#### [2] Making a spin turn:

- For making a counterclockwise spin turn:  
Pushing right travel lever forward and pulling left travel lever back simultaneously causes both rubber tracks to rotate in opposite direction to make counterclockwise spin turn.
- For making clockwise spin turn:  
Pushing left travel lever forward and pulling right travel lever back simultaneously causes both rubber tracks to rotate in opposite directions to make clockwise spin turn.



#### [3] Changing travel direction while travelling forward or backward:

- For making left turn while travelling forward:  
With the right travel lever pushed forward, return only the left travel lever to Neutral.
- For making left turn while travelling backward:  
With the right travel lever pulled back, return only the left travel lever to Neutral.
- For making right turn while travelling forward:  
With the left travel lever pushed forward, return only the right travel lever to Neutral.
- For making right turn while travelling backward:  
With the left travel lever pulled back, return only the right travel lever to Neutral.

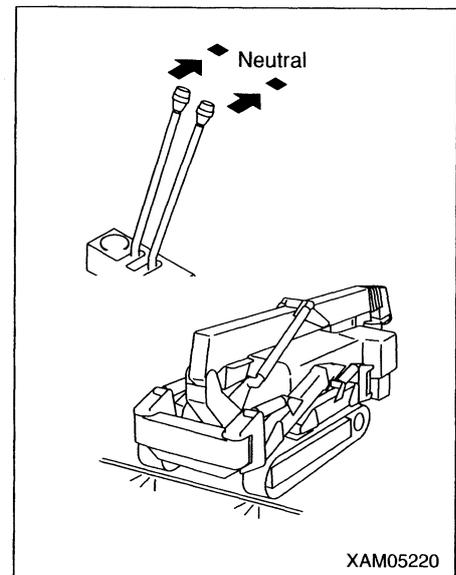
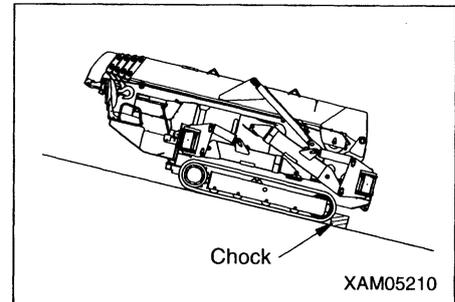


## 2.8 Stopping and parking the machine

### **⚠ WARNING**

- Avoid making a sudden stop and bring the machine to stop slowly where possible.
- Select hard and level ground for parking the machine. If you have to park it on slope, engage chock to prevent it from rolling.
- As long as the engine is running, touching the travel lever carelessly causes the machine to start suddenly and will result in a serious accident.
- Before leaving the machine, shutdown the engine and be sure to remove the main starter key.

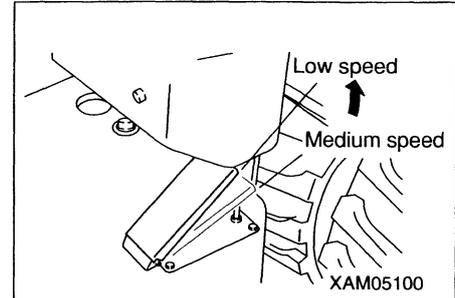
1. Placing both right and left travel levers in Neutral simultaneously, causes the brake system to be applied automatically for the machine to come to stop.



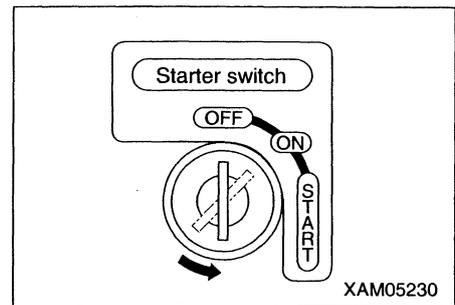
## 2.9 Stopping the engine

### OUR ADVICE

- Stopping the engine before it is sufficiently cooled may shorten useful life of its various part. Do not stop it abruptly except for emergency.
- When your engine is overheated, do not stop it immediately but run it at medium speed to gradually cool it before shutting it down.
- Make sure that the main switch in radio control box is in OFF position.



1. Take your foot off the accelerator pedal to run the engine at low speed.
2. Turn the key in starter switch to OFF position. Engine will stop.
3. Remove the key of starter switch.



## 2.10 Inspection and check after stopping the engine

1. Check for oil and water leakage, and visually check undercarriage, crane and other externals. Correct any abnormality.
2. Fill-up the fuel tank.
3. Fallen leaves or trash deposited around engine should be removed as it may cause fire.
4. Remove dirt deposited around undercarriage and outrigger.

## 2.11 Rules for travelling

### ⚠ WARNING

Neglecting these rules for travelling will result in serious accident.

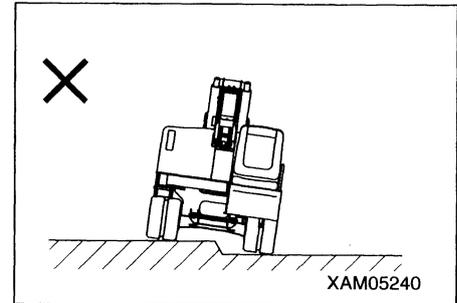
#### [1] Rules for travelling

Climbing over obstacle such as boulder or stump gives the machine (undercarriage in particular) a great impact and creates the cause for damage.

Avoid such obstacle or remove it, do not climb over it where possible.

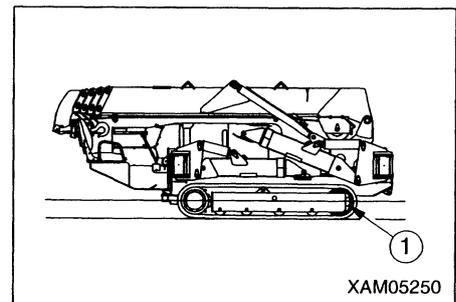
When inevitable, be sure to let the machine assume Travel position to lower its center of gravity and slow down the travel speed as much as possible, before going over using the center of each track.

★ See Part III Operation, 2.5 Travel Position of the machine for detail.



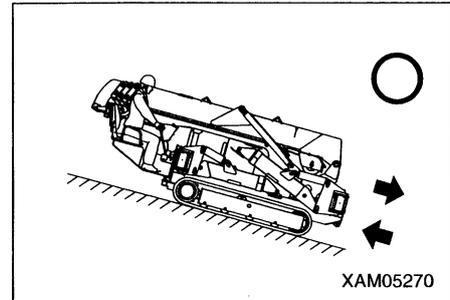
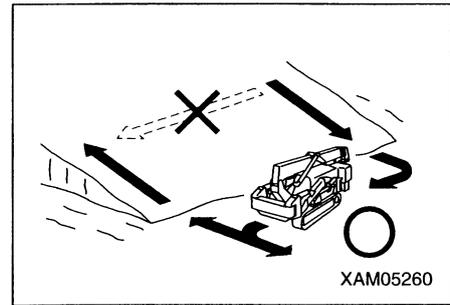
#### [2] Permissible depth of water

For underwater work, this machine may be used to the depth of the center of idler ①.



#### [3] Rules for uphill or downhill operation

- Travelling on any slope steeper than 15 degrees should be avoided as it may cause tipping over.
- Never attempt to change direction on or while going across slope. Go down to flat land first or detour for the safety.
- For going downhill, reduce travel speed as much as possible with combined use of acceleration pedal and travel lever. While placing travel lever in Neutral causes the brake system to be applied automatically, going downhill at high speed may result in overrunning.
- For travelling on slope, be sure to position the machine at right angle to the slope and operator should operate from hill side of the machine.
- If engine stops in the middle of slope, place the travel lever in Neutral before attempting to start the engine.



## 2.12 Setting up the outrigger

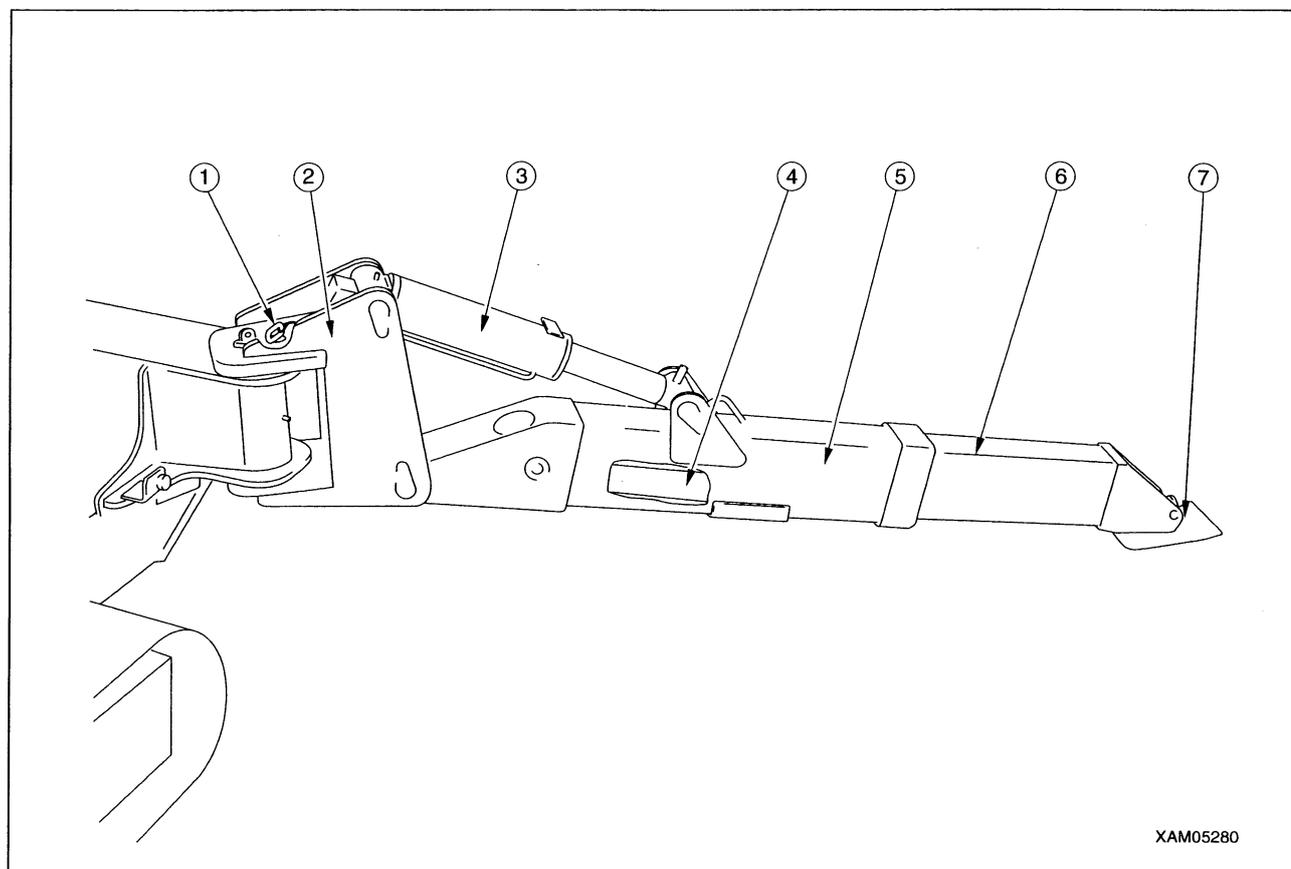
### **⚠ WARNING**

- For setting up the outrigger, select hard and level ground where possible. If you must set the outrigger inevitably on soft ground, place hard plates under the outrigger floats so that the outrigger does not sink during crane work.
- When setting up the outrigger, do not allow any person to approach it as a serious accident may result, such as your foot being caught by outrigger.
- When setting up the outrigger, be sure to watch leveling instrument so that levelness of the machine is secured. Outrigger should be set so that the rubber track is about 50mm off the ground. After setting up, press each of the four outriggers to make sure that load is being applied evenly.
- While the outrigger of this machine may be set up freely according to terrain, in case it is impossible to set up to the "Maximum Extension", crane work should be performed within the value shown in the column of "Rated Total Load for without extending outriggers to maximum" in the Rated Total Load Chart. Further, depending on the angle of outrigger setting, there are range where crane work is prohibited. Avoid performing crane work within such range.
- Except while you are telescoping the outrigger cylinder, e.g. installation and removal of positioning pin, work should be carried out with engine shutdown. If any person touches outrigger switch inadvertently, outrigger cylinder can be suddenly actuated and serious accident can be incurred.
- During the outrigger setting work, be sure to have each position pin inserted fully and snap pin fixed to prevent the position pin from coming off.  
For setting up the outrigger, be sure to extend the outrigger inner box.  
Do not perform outrigger extension work with the outrigger inner box stowed.
- This machine has 4 outriggers. Be sure to use individual outrigger correctly. Check the relations between the numbers shown on Instruction Plate at the switch and number plate affixed on each individual outrigger. Incorrect operation can result in serious accident.
- When you operate two outrigger switches simultaneously, operate two for front ([①] and [④]) and two for rear ([②] and [③]). Operating two switches of left and right side simultaneously may cause the machine to tip over.
- For floating the machine off ground, operate four outrigger switches in such manner as the four outriggers go up evenly and bit by bit. Floating rapidly with two outriggers on one side may cause the machine to tip over.
- When operating the outriggers, run the engine at low speed. Leaving the engine at high revolution may cause the outrigger to actuate suddenly, inviting serious accident including tipping over of the machine...

#### OUR ADVICE

- For operation of the outrigger, place the work selection switch at Outrigger position.

#### [1] Components of outrigger

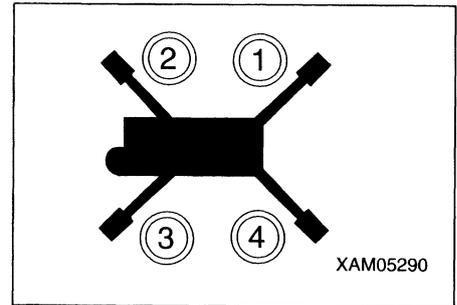


- |                       |                          |
|-----------------------|--------------------------|
| ① Position pin        | ⑤ Outer box              |
| ② Rotary              | ⑥ Inner box              |
| ③ Setting up cylinder | ⑦ Rigger adapter (Float) |
| ④ Extension cylinder  |                          |

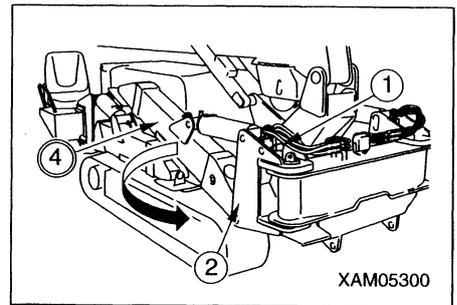
## Extending the Outrigger

### [2] Works to be done with engine stopped

This machine has 4 outriggers. Method for setting up the outrigger is described below for the outrigger ④ only. The same applies to other 3 outriggers as well.

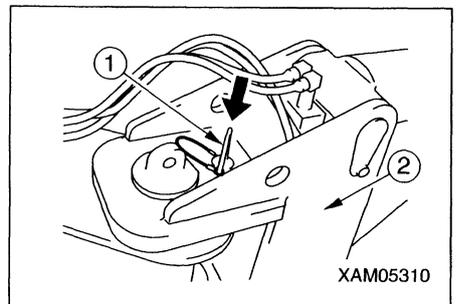


1. Withdraw position pin ① of rotary ② and rotate the rotary outward.



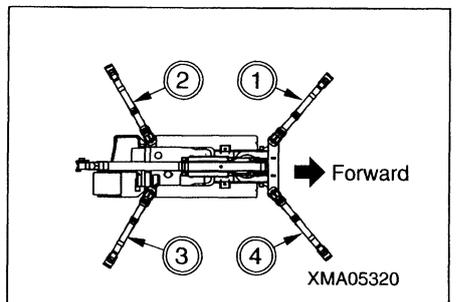
2. With the rotary ② turned outward, insert position pin ① where the holes meet.

★ A chain is attached to the position pin ① for prevention of loosing.



3. Prepare other 3 outriggers in the same manner.

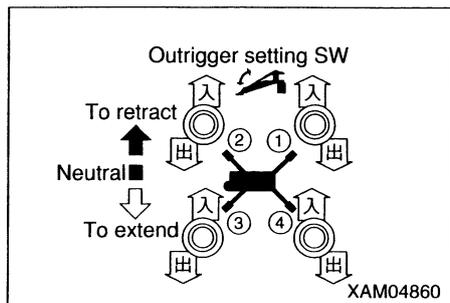
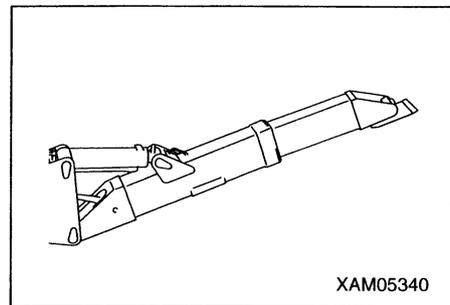
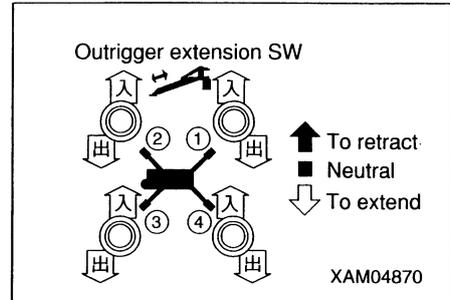
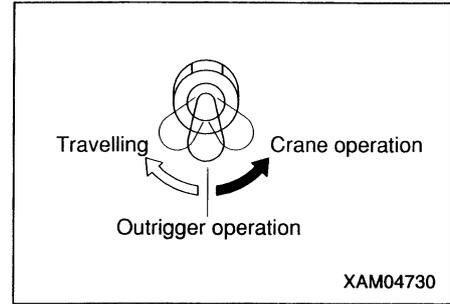
4. After completion of the preparation, make sure that the position pins are correctly inserted to outriggers ① ~ ④.



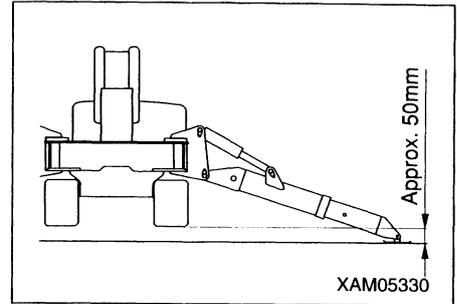
### III OPERATION

#### [3] Works to be done after starting engine

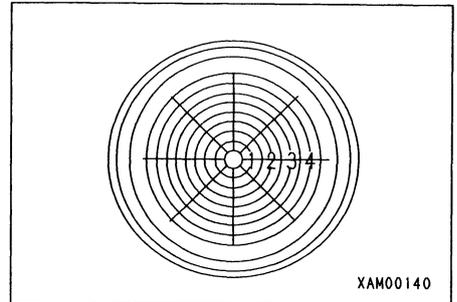
1. Start the engine. See Part III Operation, 2.2 Starting up the engine for detail.
2. For operating the outrigger, place the work selector switch at Outrigger.
3. Check the number on instruction plate of outrigger switch and decide the outrigger you desire to actuate.
4. Take your foot off acceleration pedal and lower the engine speed.
5. Push down (extension) the outrigger extension switch individually or two at a time. When the extension cylinder is extended all the way, turn the switch to Neutral.
6. Adjustment of outrigger extension should be carried out while referring to the seal (Midway and Max.) affixed to the top of inner box.
7. Push down the outrigger set up switch individually or two at a time. When the set up cylinder is extended for the float to be grounded, place the switch at Neutral. Operate other switches in the same manner so that floats of all the four outriggers are grounded before placing each switch at Neutral.
8. After grounding all the floats, push the outrigger set up switch individually or two at a time. When the machine is slightly lifted with the set up cylinders extended, place the switch at Neutral. Operate other outriggers in the same manner so that 4 outriggers are lifted to the same height and place the switch at Neutral. Repeat this operation to gradually lift the machine off the ground until the rubber track is at 50mm high.



9. When the machine reaches about 50mm off the ground, while watching leveling instrument, operate the outrigger set up switches until the machine is level.



10. Upon completion of outrigger setting, place all the outrigger switches at Neutral.

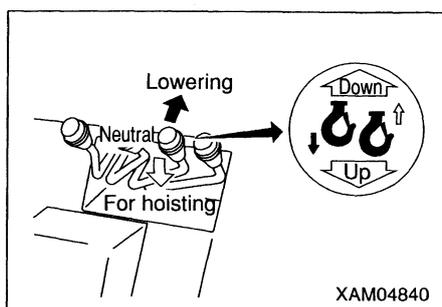
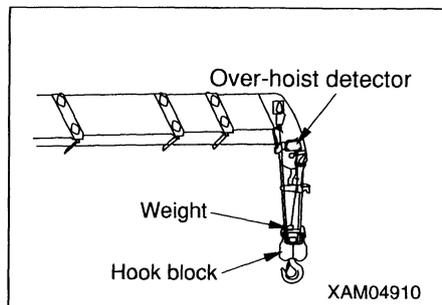


## 2.13 Matters to be known before starting the crane work

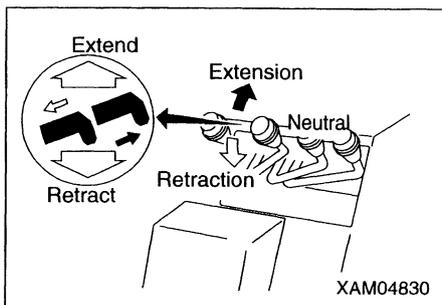
### **⚠ WARNING**

Negligence of following matters may lead to serious accident.

- Over-hoisting the hook block causes horn and voice, “Hook has been over-hoisted” to sound. When it happens, release the winch lever immediately so it returns to neutral to stop hoisting.

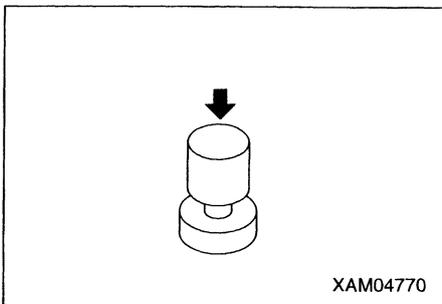


- Extending the boom makes the hook block to be hoisted, causing horn and voice, “Hook has been over-hoisted” to sound. When it happens, release the boom telescoping lever so it returns to neutral to stop boom telescoping.



- During crane work, if you need to warn the surroundings about the danger, press horn switch to sound the horn.

- Make sure that all the outriggers are extended properly.



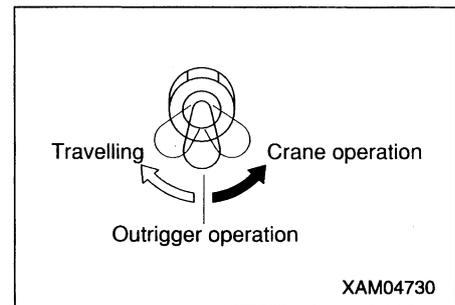
## 2.14 Operations prior to starting crane work

### OUR ADVICE

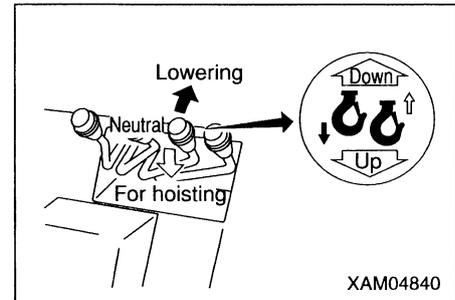
- Before operating crane control levers or outrigger switches, place the work selector switch at Crane or Outrigger.
- When lowering hook block from stowed location, do not allow the whole hook block to lie on the ground by loosening the wire rope excessively. It constitutes the cause for disorderly take-up on winch drum.

Before proceeding to your crane work, take the following steps:

1. Place the work selector switch in Crane position.



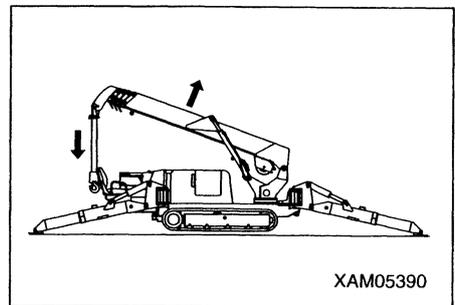
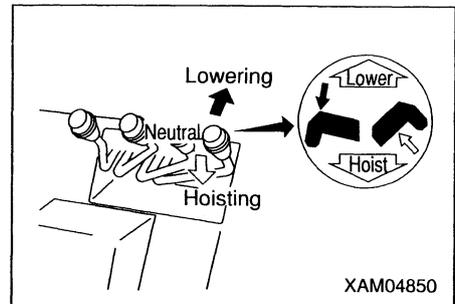
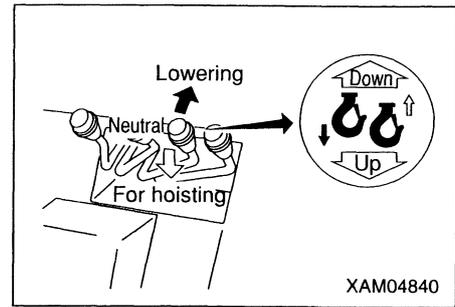
2. Move the winch lever to Lower position to release the locking of hook block.



## 2.15 Crane work position

Upon completion of "Operations prior to starting crane work" in preceding section 2.14, let the machine assume Crane Work Position in the following manner:

1. Operate the winch lever downward to Lower position and lower the hook block to the extent that it is not grounded.
2. Operate the boom hoist lever to Hoist position and hoist the boom to such angle where hook block is not over-hoisted or grounded.



## 2.16 Hoisting and lowering operation

### ⚠ WARNING

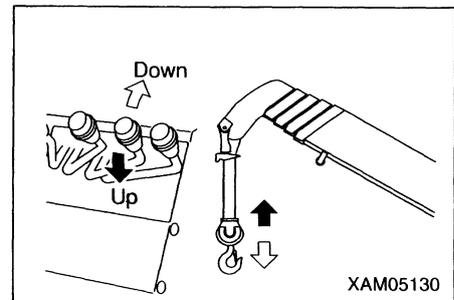
- When lifting a load, the load will move slightly forward due to bending of the boom. Wiring personnel should be aware of this.
- When hook block is hoisted in excess, over-hoisting is detected causing the horn and voice to sound. When you hear the horn and voice, immediately return the winch lever to neutral to stop hoisting.
- When you lower the hook way down for underground work or the like, you should leave the wire rope at least 3 windings on the drum.

### OUR ADVICE

Do not ground the hook block. It may cause wire rope to be wound disorderly on the drum to cause damage.

Operate the winch lever in the following manner:

- Lowering: Push the lever forward to Lower position.
- Neutral: Take your hand off the lever. Lever will return to Neutral position and hoisting or lowering of the hook block will stop.
- Hoisting: Pull back the lever to Hoist position.
- ★ Adjust the winch hoisting or lowering speed with the stroke of winch lever and acceleration pedal.



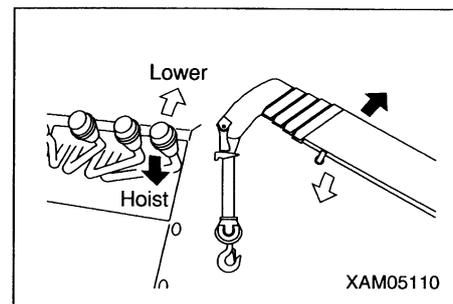
## 2.17 Boom hoisting and lowering operation

### **⚠ WARNING**

- Boom hoist lever should be operated as slowly as possible. Rapid lever operation particularly with a load lifted, will cause the load to sway and machine to incur a big shock, resulting in damaging the crane or tipping it over.
- Lowering the boom causes the working radius to increase and liftable rated total load to reduce. When you work while hoisting or lowering the boom, use care that the mass (weight) of load does not cause over-loading when the boom is lowered.

Operate the boom hoist lever in the following manner:

- Lowering: Push the lever forward to Lower position.
- Neutral: Take your hand off the lever. Lever will return to Neutral position and hoisting or lowering of the boom will stop.
- Hoisting: Pull back the lever to Hoist position.
- ★ Adjust the boom hoisting or lowering speed with the stroke of boom hoist lever and acceleration pedal.



## 2.18 Boom telescoping operation

### ⚠ WARNING

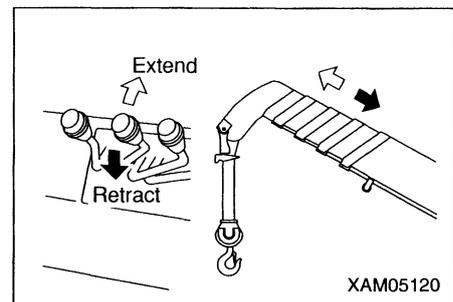
- Operate the boom telescoping boom as slowly as possible. Rapid lever operation particularly with a load lifted, will cause the load to sway and machine to incur big shock, resulting in damaging the crane or tipping it over.
- Do not use boom telescoping action for dragging a load laterally or pulling it in.
- Extending the boom causes the working radius to increase and the liftable rated total load to reduce. When you work while telescoping the boom, use care that the mass (weight) of load does not cause over-loading when the boom is extended to the maximum.
- While the boom is being extended, hook block will keep being hoisted. If the over-hoist preventive device buzzer sounds while you are extending the boom, place the boom telescoping boom in Neutral immediately to stop telescoping of the boom.

### OUR ADVICE

- While the boom is being telescoped, the hook block will keep either being hoisted or lowered. Winch should be operated simultaneously to keep the hook block height also being adjusted.
- Leaving the boom extended for long time causes the boom to slightly to retract due to change in hydraulic oil temperature or the like. In such a case, boom length should be adjusted appropriately.

Operate the boom telescoping lever in the following manner:

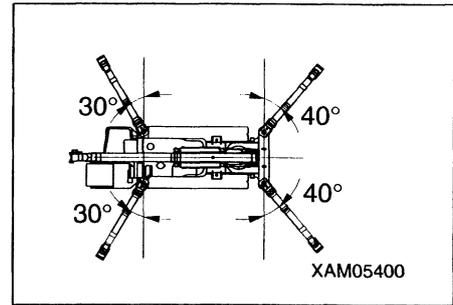
- Extending: Push the lever forward to Extending position.
- Neutral: Take your hand off the lever. Lever will return to Neutral position and telescoping of the boom will stop.
- Retracting: Pull back the lever to Retract position.
- ★ Adjust the boom telescoping speed with the stroke of boom telescoping lever and acceleration pedal.



## 2.19 Swing operation

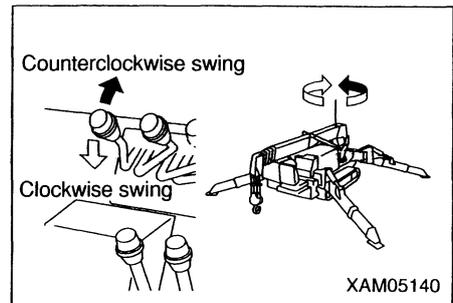
### ⚠ WARNING

- Before making swing motion, be sure to ascertain the safety of surrounding by sounding the horn.
- Swing lever should be operated as slowly as possible.
- When boom hoist angle is small, pay attention to avoid operator or the machine being hit by the boom in swing motion.
- Always to try to start smoothly, swing at low speed and stop gently. Rapid lever operation with a load lifted will cause the load to sway and machine stability to be lost, resulting in damaging the crane or tipping it over.
- Even with the outrigger grounded normally, there can be a direction in which stability is lower if and when the machine is rotated 360 degrees. Be extra careful when you make a swing with a load lifted.



Operate the swing lever in the following manner:

- Counterclockwise swing: Push the lever forward to Left position.
  - Neutral: Take your hand off the lever. Lever will return to Neutral position and the swing motion will stop.
  - Clockwise swing: Pull back the lever to Right position.
- ★ Adjust the swing motion speed with the stroke of swing lever and acceleration pedal.



## 2.20 Accelerator pedal operation

### **⚠ WARNING**

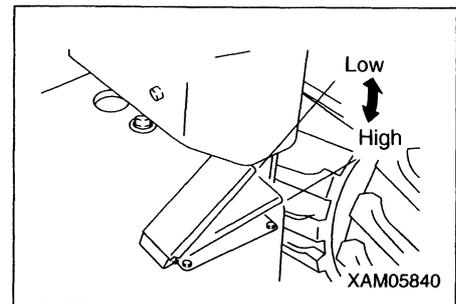
It is dangerous to increase speed of any crane action rashly.

### **OUR ADVICE**

At the start or near the end of any action, reduce speed. Also adapt high or low speed to the load you are actually lifting.

Operate the accelerator pedal in the following manner:

- **Low idling:** Take your foot off the pedal, which will cause the engine speed to reduce and therefore any other motion to slow down.
- **Full speed:** Step on the pedal all the way, which will cause the engine speed to increase and consequently any motion speed to increase.
- ★ **Lock the pedal to the optimum engine speed position for required work.**



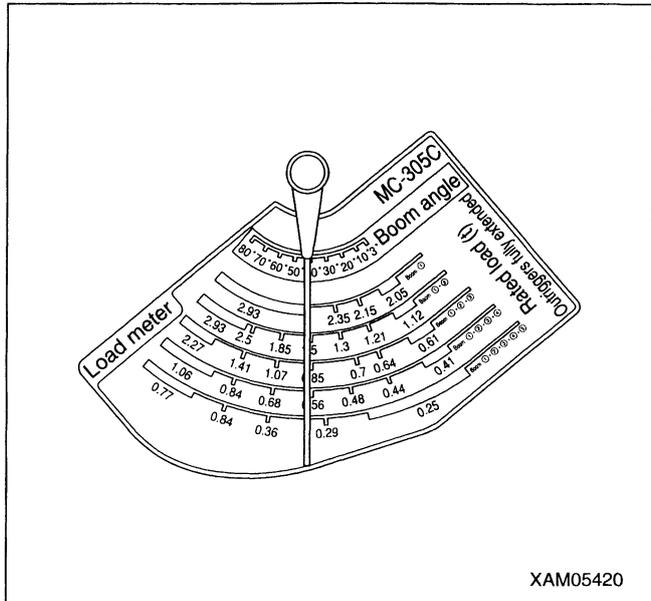
## 2.21 How to use load indicator and load meter

### ⚠ WARNING

- Understand how to use the load indicator and load meter so you can perform your crane work safely, not exceeding rated total load.
- When you lift a load, if the pointer of load meter should exceed such rated total load as is read on load indicator, the load should be grounded immediately. Continuing to lift as it is, may cause the machine to be damaged or tipped over.
- If a load exceeds rated total load, reduce the working radius by either shortening the boom or raising the boom.

#### [1] Usage of load indicator and load meter with “Outrigger extended to maximum”

For performing crane work, read the rated total load on the load indicator and mass (weight) of the lifting load on the load meter in the following manner: Incidentally, the rated total load includes mass (weight) of hook block, 0.03 ton.



XAM05420

1. Operate boom hoist lever to hoist the boom before stopping at desired angle.
2. The boom angle should be read as the value where the column “Boom Angle” on the load indicator and pointer crosses each other.
3. Operate boom telescoping lever to extend the boom to desired length.
4. The rated total load should be read as the value where the “Scale of Boom Length in Use” in the column “Rated Total Load with Outrigger Extended to Maximum” on the load indicator and the pointer crosses each other.

MC-305C Rated Total Load Chart

| With Outrigger Extended to Maximum |  |  |  |                |  |      |  |      |  | With Outrigger Extended to Midway |  |      |  |      |  |                |  |      |  | With Outrigger Extended to Minimum |  |                |  |      |  |      |  |      |  |                |  |      |  |      |  |      |  |       |  |                |  |      |  |     |  |     |  |     |  |      |  |      |  |      |  |       |  |
|------------------------------------|--|--|--|----------------|--|------|--|------|--|-----------------------------------|--|------|--|------|--|----------------|--|------|--|------------------------------------|--|----------------|--|------|--|------|--|------|--|----------------|--|------|--|------|--|------|--|-------|--|----------------|--|------|--|-----|--|-----|--|-----|--|------|--|------|--|------|--|-------|--|
| Boom ① and Boom ①+②                |  | 2.5 or shorter   |  | 3.0            |  | 3.5  |  | 4.0  |  | 4.5                               |  | 5.0  |  | 5.62 |  | 2.5 or shorter |  | 3.0  |  | 3.5                                |  | 4.0            |  | 4.5  |  | 5.0  |  | 5.62 |  | 2.5 or shorter |  | 3.0  |  | 3.5  |  | 4.0  |  | 4.5   |  | 5.0            |  | 5.62 |  |     |  |     |  |     |  |      |  |      |  |      |  |       |  |
| Working Radius (m)                 |  | 2930   |  | 2350           |  | 1950 |  | 1670 |  | 1380                              |  | 1140 |  | 950  |  | 2930           |  | 2350 |  | 1950                               |  | 1670           |  | 1380 |  | 1140 |  | 950  |  | 2930           |  | 2350 |  | 1800 |  | 1430 |  | 950   |  | 790            |  |      |  |     |  |     |  |     |  |      |  |      |  |      |  |       |  |
| Rated total load (kg)              |  | 2930   |  | 2350           |  | 1950 |  | 1670 |  | 1380                              |  | 1140 |  | 950  |  | 2930           |  | 2350 |  | 1950                               |  | 1670           |  | 1380 |  | 1140 |  | 950  |  | 2930           |  | 2350 |  | 1800 |  | 1430 |  | 950   |  | 790            |  |      |  |     |  |     |  |     |  |      |  |      |  |      |  |       |  |
| Boom ①+②+③                         |  | When boom ③ is extended to any extent, work should be carried out based on the performance of Boom ①+②+③.                      |  | 2.7            |  | 3.0  |  | 3.5  |  | 4.0                               |  | 4.5  |  | 5.0  |  | 5.5            |  | 6.0  |  | 7.0                                |  | 7.82           |  | 2.7  |  | 3.0  |  | 3.5  |  | 4.0            |  | 4.5  |  | 5.0  |  | 5.5  |  | 6.0   |  | 7.0            |  | 7.82 |  |     |  |     |  |     |  |      |  |      |  |      |  |       |  |
| Working Radius (m)                 |  | 2270   |  | 2090           |  | 1680 |  | 1415 |  | 1230                              |  | 1070 |  | 945  |  | 790            |  | 610  |  | 520                                |  | 430            |  | 2270 |  | 2090 |  | 1680 |  | 1370           |  | 1120 |  | 910  |  | 790  |  | 670   |  | 510            |  | 430  |  |     |  |     |  |     |  |      |  |      |  |      |  |       |  |
| Rated total load (kg)              |  | 2270   |  | 2090           |  | 1680 |  | 1415 |  | 1230                              |  | 1070 |  | 945  |  | 790            |  | 610  |  | 520                                |  | 430            |  | 2270 |  | 2090 |  | 1680 |  | 1370           |  | 1120 |  | 910  |  | 790  |  | 670   |  | 510            |  | 430  |  |     |  |     |  |     |  |      |  |      |  |      |  |       |  |
| Boom ①+②+③+④                       |  | When boom ④ is extended to any extent, work should be carried out based on the performance of Boom ①+②+③+④.                    |  | 4.0            |  | 4.5  |  | 5.0  |  | 6.0                               |  | 7.0  |  | 8.0  |  | 9.0            |  | 9.99 |  | 4.0                                |  | 4.5            |  | 5.0  |  | 6.0  |  | 7.0  |  | 8.0            |  | 9.0  |  | 9.99 |  | 4.0  |  | 4.5   |  | 5.0            |  | 6.0  |  | 7.0 |  | 8.0 |  | 9.0 |  | 9.99 |  |      |  |      |  |       |  |
| Working Radius (m)                 |  | 1060   |  | 950            |  | 860  |  | 750  |  | 630                               |  | 490  |  | 410  |  | 350            |  | 250  |  | 1060                               |  | 950            |  | 860  |  | 750  |  | 630  |  | 490            |  | 410  |  | 350  |  | 250  |  | 1060  |  | 950            |  | 860  |  | 750 |  | 630 |  | 490 |  | 340  |  | 300  |  |      |  |       |  |
| Rated total load (kg)              |  | 1060   |  | 950            |  | 860  |  | 750  |  | 630                               |  | 490  |  | 410  |  | 350            |  | 250  |  | 1060                               |  | 950            |  | 860  |  | 750  |  | 630  |  | 490            |  | 410  |  | 350  |  | 250  |  | 1060  |  | 950            |  | 860  |  | 750 |  | 630 |  | 490 |  | 340  |  | 300  |  |      |  |       |  |
| Boom ①+②+③+④+⑤                     |  | When more than one-half of mark is exposed from boom ④, work should be carried out based on the performance of Boom ①+②+③+④+⑤. |  | 4.5 or shorter |  | 5.0  |  | 6.0  |  | 7.0                               |  | 8.0  |  | 9.0  |  | 10.0           |  | 11.0 |  | 12.16                              |  | 4.5 or shorter |  | 5.0  |  | 6.0  |  | 7.0  |  | 8.0            |  | 9.0  |  | 10.0 |  | 11.0 |  | 12.16 |  | 4.5 or shorter |  | 5.0  |  | 6.0 |  | 7.0 |  | 8.0 |  | 9.0  |  | 10.0 |  | 11.0 |  | 12.16 |  |
| Working Radius (m)                 |  | 775  |  | 640            |  | 495  |  | 410  |  | 360                               |  | 320  |  | 290  |  | 260            |  | 250  |  | 775                                |  | 640            |  | 495  |  | 410  |  | 360  |  | 320            |  | 290  |  | 260  |  | 250  |  | 775   |  | 640            |  | 495  |  | 410 |  | 360 |  | 290 |  | 240  |  | 210  |  |      |  |       |  |
| Rated total load (kg)              |  | 775  |  | 640            |  | 495  |  | 410  |  | 360                               |  | 320  |  | 290  |  | 260            |  | 250  |  | 775                                |  | 640            |  | 495  |  | 410  |  | 360  |  | 320            |  | 290  |  | 260  |  | 250  |  | 775   |  | 640            |  | 495  |  | 410 |  | 360 |  | 290 |  | 240  |  | 210  |  |      |  |       |  |

Notes

1. The Rated Total Load Chart indicates the value for work on level, hard ground. Sufficient attention should be paid for because, depending on the ground conditions where outrigger is placed, the crane can tip over.
2. The Rated Total Load Chart is based on actual working radius which includes bend of boom due to lifting load. Rough operation is extremely dangerous even if you are working within the rated total load. Learn to always perform safe operation.
3. Depending on extension and placement of outrigger, crane could tip over even by lifting a rated total load. Be always alert.
4. Rated total load shown includes the weight of hook block (30kg).

Above diagram is for reference use only and may be different in actual cases.

### III OPERATION

#### Boom Length (Part 1)

Boom lengths (Standard boom length) in the Rated Total Load Chart appear in the order starting with the shorter.

##### Boom ①

With all the boom stages retracted.

##### Boom ①+②

With the 3rd, 4th and 5th stage booms all retracted, the 2nd boom is extended fully.

##### Boom ①+②+③

With the 4th and 5th stage booms all retracted, the 2nd and 3rd stage booms are extended fully.

##### Boom ①+②+③+④

With the 4th and 5th stage booms extended to midway, the 2nd and 3rd booms are extended fully (One-half of XX mark on the 4th boom being exposed from the 3rd boom).

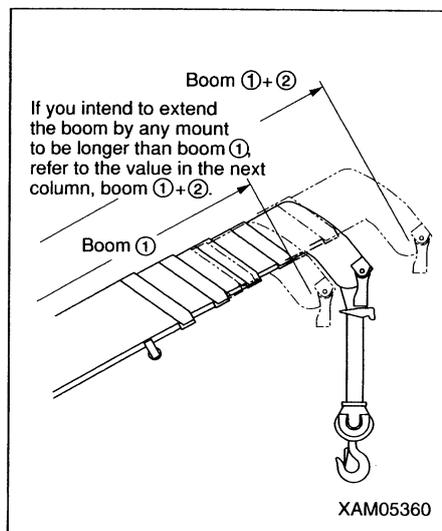
##### Boom ①+②+③+④+⑤

Boom is extended totally.

#### Boom Length (Part2)

When actual boom length has exceeded the boom length shown on the Rated Total Load Chart (Standard boom length), carry out your crane work based on the value shown in the column for next boom length.

For example, if your boom is extended to any extent longer than boom ①, refer to the column of next length; Boom ①+②.



5. While watching the lifting load and load meter, read the value on the load meter immediately after the load lifts off the ground (lift off).

The load should be detected in the following manner:

(1) Operate the winch lever to lift the hook block with no load engaged (no-load).

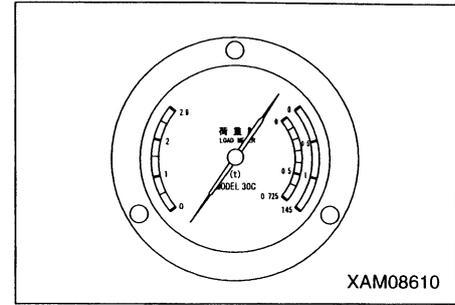
(2) Operate the accelerator lever to adjust engine speed so that the pointer of load meter indicates zero (0).

★ Remember the position of the accelerator lever at this time.

(3) Engage the lifting load with hook block and adjust engine speed to the value acquired in preceding paragraph (2).

(4) Operate the winch lever and read the value indicated by the pointer of load meter immediately after the load lifts off the ground (lift off).

★ It should be noted that the load meter indicates the weight of load being hoisted with winch only, but it does not indicate weight of load being lifted by any other means.



6. If the mass read on the load meter is less than such "Rated Total Load" of load indicator as was read with step (4) above, your crane work will be safe.

**[2] How to use load indicator with outrigger extended to midway or minimum:**

For working with outrigger extended to midway or minimum, read the boom angle in accordance with load indicator, then based on such angle, read working radius in accordance with Working Radius/Lifting Height Diagram and finally read the load in the column of Rated Total Load Chart for the Outrigger Extended to Midway or Minimum configuration.

**(Example) Minimum extension**

While working with boom ③, if the boom angle read from load indicator is 40 degrees, read the value of rated total load in the following manner:

1. From the Working Radius/Lifting Height Diagram, read the working radius for boom ③ and for boom angle of 40 degrees. The working radius for this case will be about 6m.
2. From the Rated Total Load Chart with the Outrigger Extended to Minimum, read the value of rated total load for working radius of about 6m which has been read in preceding subparagraph 1 for the boom configuration of ①+②+③.

In case the working radius is about 6m, the rated total load of 670kg for the working radius of 6m in the Rated Total Load Chart will be the rated total load.

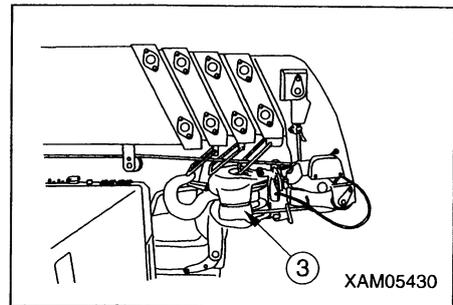
3. Read the weight of lifting load and if it is less than Rated Total Load, your work will be safe.

## 2.22 Stowing the Crane

### OUR ADVICE

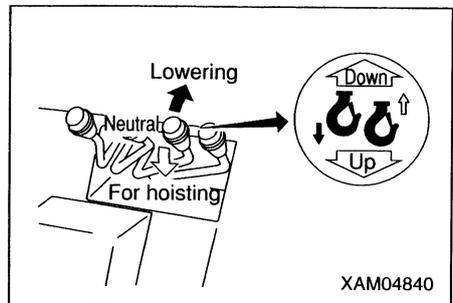
- Before locking the hook block, stop its swaying first.
- Retracting the boom causes the hook block to be lowered. Lowering the boom also lowers the hook block. Hoist the hook block in parallel so that hook block will not be grounded or come into interference with the machine.

1. Have the boom totally retracted.
2. Have the boom lowered all the way.

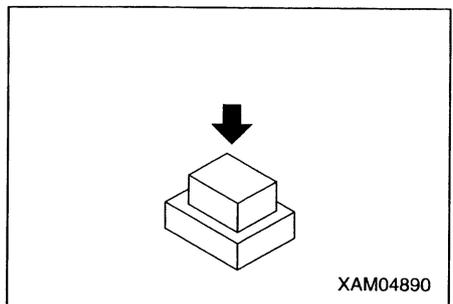


3. Pull back the winch lever to Hoist position to winch the hook block ③. Wire rope will pull the hook block so that the whole crane is locked.

- When over-hoisted, hoisting will stop and horn and voice, "Hook has been over-hoisted" will sound.



- Hook will be stowed if you hoist the hook block while depressing the hook stowing switch.



## 2.23 Stowing the outrigger

### **⚠ WARNING**

- When stowing the outrigger, do not allow anyone to approach. Serious accident may result such as being caught between the outrigger and basic machine.
- Any work other than outrigger cylinder extension and grounding, should be carried out with the engine shutdown. If someone inadvertently touches the outrigger switch, outrigger cylinder will actuate suddenly causing serious accident.
- Removing position pins causes box and bracket to rotate as they lose support. Be sure to hold them with single hand before pulling out position pins.
- When stowing the outrigger, do not allow your hand or finger to approach any gap of moving part. It may lead to serious accident such as being caught.
- Before stowing the outrigger, insert each position pin securely.
- This machine has 4 outriggers. Do not mix up the use of 4 outriggers. Check the numbers shown on control plate at the switch with the number plates affixed to each outrigger. Improper operation will result in serious accident.
- When operating the outrigger, run the engine at low speed. Leaving it running at high speed causes sudden actuation of outrigger, resulting in serious accident including tipping over of the machine.
- When you lower floated machine to ground, operate 4 outrigger switches so that all the 4 outriggers are lowered evenly in small increments. Rapidly retracting 2 outriggers on one side causes the machine to be unstable and even to tip over.

#### [1] Procedures to be performed after starting the engine

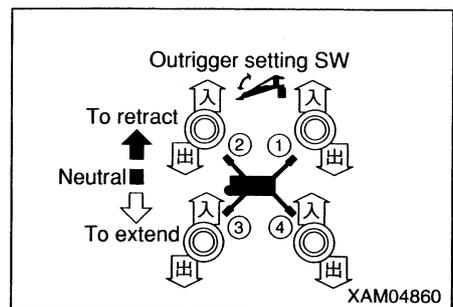
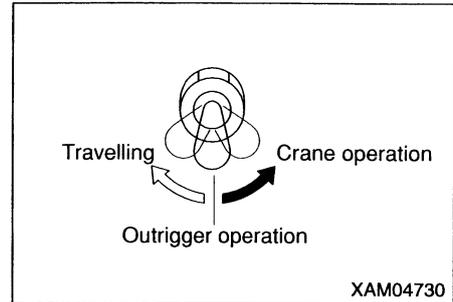
With your engine started and running:

★ See Part III Operation 2.2 Starting up the engine for detail.

1. For operating the outrigger, place the work selector switch at Outrigger position.
2. By checking the number on control plate of outrigger set up switch, determine the outrigger you desire to actuate.
3. Push up the outrigger set up switch, one of them at a time or two simultaneously, to ON position.
4. When, with the outrigger retracting, the machine starts to lower, place the switch in Neutral for the time being.

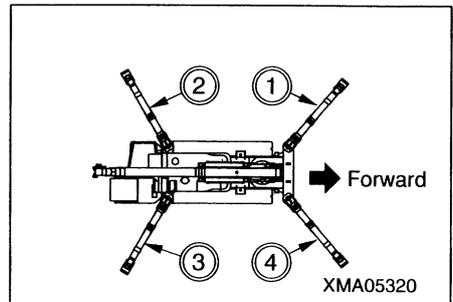
Operate the remaining switches in the same manner so that 4 outriggers rise to equal height, place switches in Neutral for the time being.

Repeat this operation to lower the machine gradually, until the rubber tracks are totally grounded.

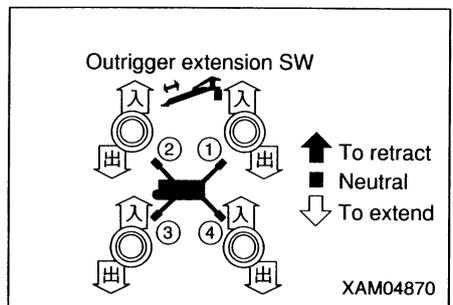


5. After both tracks are completely grounded, continue to push up the outrigger switch, one at a time or 2 simultaneously to IN position.

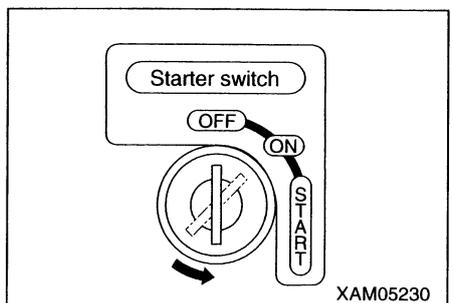
When, with the outrigger telescoping cylinder having retracted completely, the outer box has reached upper limit, take your finger off the outrigger set up switch.



6. Push the outrigger extension switch to ON position, one at a time or 2 simultaneously. When the extension cylinder has retracted completely, place the outrigger extension switch in Neutral.



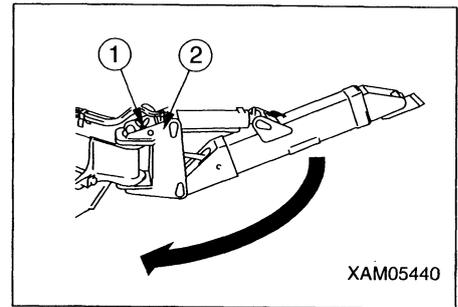
7. Turn the starter switch to OFF position and the engine will stop.



#### [2] Procedures to be performed after engine has been shutdown.

Although, the method for stowing outrigger is described hereunder with regard to the outrigger ④ only, follow the procedure for other 3 outriggers as well:

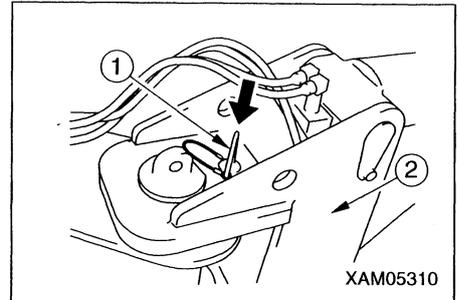
1. After removing position pin ① from rotary ②, turn the rotary inward.



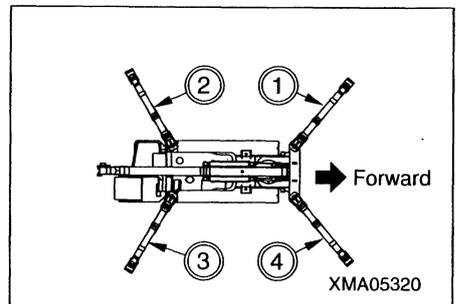
2. With the rotary ② turned inward, insert position pin ① where pin holes meet.

★ Position pin ① has a chain for prevention of losing pin.

3. Stow away other outriggers in the same manner.



4. After stowing away the outriggers, make sure that each pin are inserted securely.



## 2.24 Matters prohibited in connection with crane operation

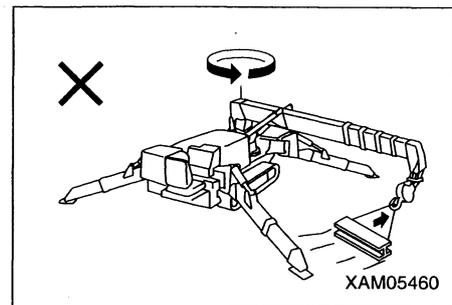
### ⚠ WARNING

- Before starting your crane work, be sure to set outriggers on level and hard ground.
- Never attempt to let your crane travel with a load lifted or to perform crane work without placing outriggers. Machine will be exposed to unstable condition, leading to serious accident including tipping over.

★ Besides the prohibitions described in this section, see various rules of operation shown in Part II Safety.

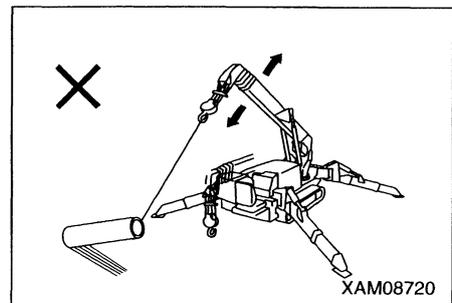
#### [1] Prohibition of working with swing force in use.

Dragging in or pulling to erect a load by means of swing motion is prohibited.



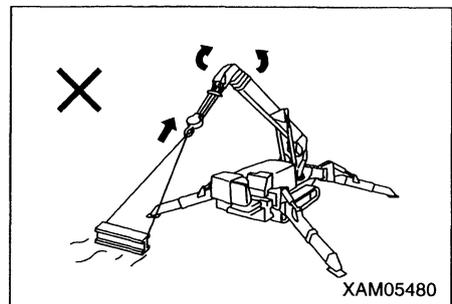
#### [2] Prohibition of working with boom hoisting force in use.

Dragging in or pulling to erect a load by means of boom hoist motion is prohibited.



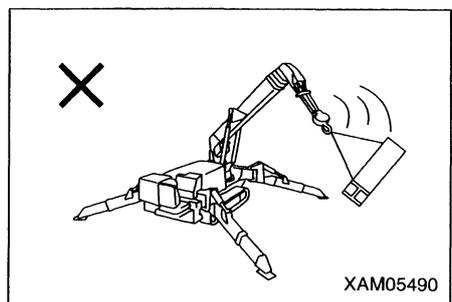
#### [3] Prohibition of working with lateral pulling, drawing, or lifting in angle

Work of lateral pulling, drawing or lifting at angle should be avoided as it applies unreasonable force to the machine. Not only it is likely to damage the machine, it is dangerous. Make sure that the hook comes directly above the center of gravity of the load.



#### [4] Prohibition of violent operation during work

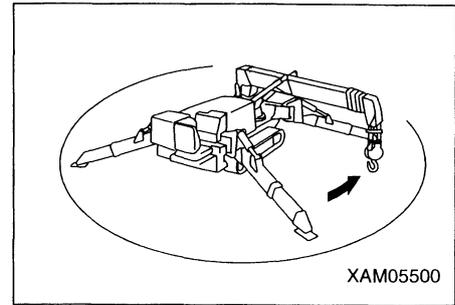
Do not operate any lever abruptly. Particularly, swinging, boom lowering and winching down should be performed slowly.



**[5] Prohibition of entering inside working radius**

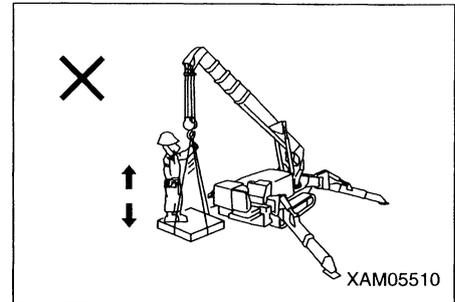
Do not allow any one to approach inside working radius such as allowing to enter underneath a lifted load.

Further, when you operate the crane from operator seat, avoid to let the lifted load to come over your head at any time.



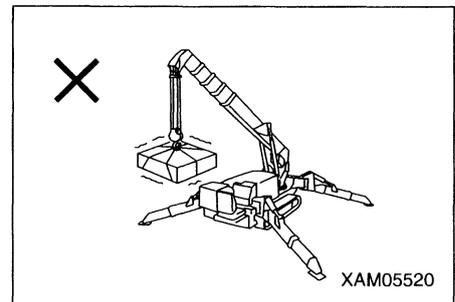
**[6] Prohibition of use for other than primary purpose**

Do not use crane as a lifter for personnel or the like.



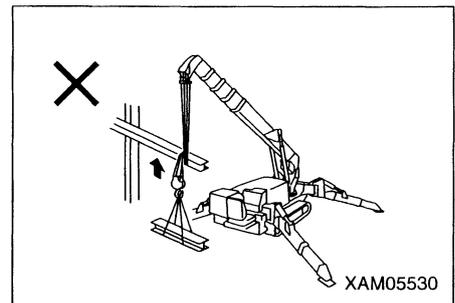
**[7] Prohibition of unreasonable work**

Any work beyond the capability or the machine leads to trouble. Crane work in particular should be performed in accordance with rated total load chart.



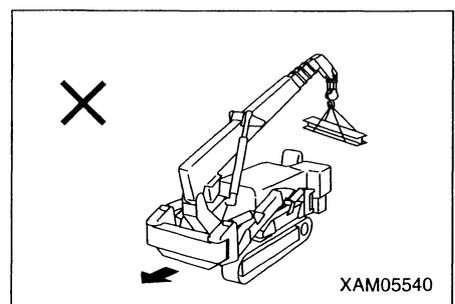
**[8] Prohibition of forcible wire rope hoisting**

Be careful for wire rope not to be caught by tree, steel structure or the like during work. Should it be entangled with something, do not forcibly hoist but disentangle it before resuming to hoist.



**[9] Prohibition of travelling with a load lifted**

Letting your crane travel with a load lifted or perform crane work without outrigger placed, may result in its tipping over and should be avoided absolutely.



## 3 Handling of Rubber Track

### 3.1 Smart way of using it

Rubber track is provided with excellent features which steel track lacks. However, when used similarly with steel track, such feature can not be fully utilized. Proceed with your work within its capability according to job site conditions or type of work.

★ This machine is provided with rubber track as the standard supply and no option of steel track is available.

#### Comparison between rubber and steel tracks

| Feature                       | Rubber track | Steel track |
|-------------------------------|--------------|-------------|
| Vibration small               | ◎            | △           |
| Travelling smooth (no squeak) | ◎            | ○           |
| Noise level low               | ◎            | △           |
| No harm to road surface       | ◎            | △           |
| Service is simple             | ◎            | △           |
| Not prone to damage           | △            | ◎           |
| Traction great                | ◎            | ◎           |

◎ : Excellent   ○ : Good   △ : Fair

While rubber track, due to its particular performance resulting from its material, demonstrates various advantages, it has inherent weak point relevant to strength as well.

Consequently, if you fully understand the features of rubber track and observe prohibitions and rules on its handling, its useful life will be extended to the maximum while exerting its advantages also to the maximum.

Prior to using it, be sure to read Part III Operation, 3.3 Prohibited type of works and 3.4 Rules for usage.

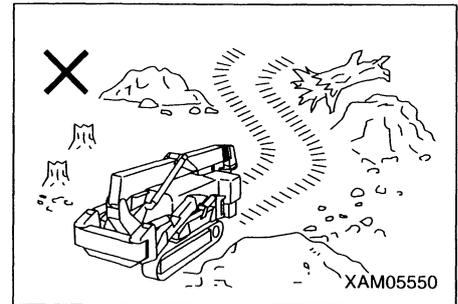
### 3.2 Warranty

Any damage is excluded from the range of warranty by supplier which is attributable to negligence by user including but not limited to failure to fulfill the requirement for inspection and services with respect to proper tension of rubber track or to observe prohibitions and rules such as “Not to work on corners of steel plate, U-shaped groove or blocks or at job site where cutting-up is likely to occur due to sharp edge of crushed stone, corner of rock, steel reinforcement member or steel scrap.

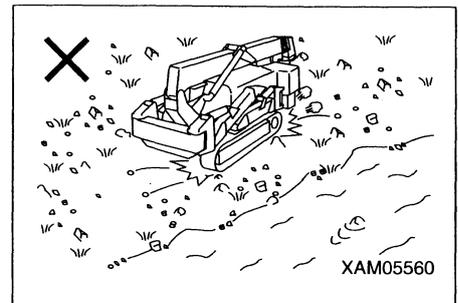
### 3.3 Prohibited type of works

Following works are prohibited:

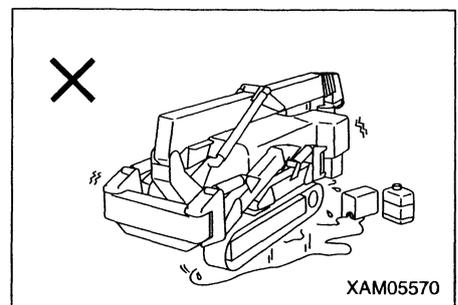
- Working and making turn on crushed stone sub-grade, hard jagged rock-bed, steel reinforcement member, steel scrap or near steel plate edge, will damage the rubber track.



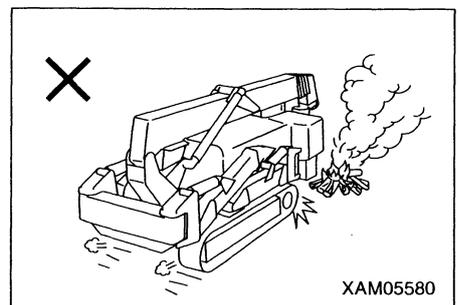
- At such job site as river location where great deal of boulders of various sizes are in existence, pebbles are likely to lodged and damage rubber track or to cause the track to come off.



- Do not allow oil or chemical solvent to get on rubber track. Wipe it off. Do not travel over oil or the like gathered on road surface either.



- Do not enter such place where temperature is high as bonfire, steel plate left in the blazing sun or newly paved asphalt.



- For long term storage, keep it indoors where it will not be exposed to direct sun or rain.

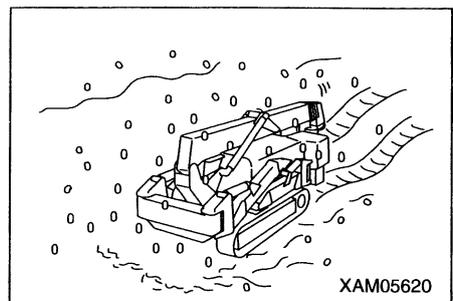
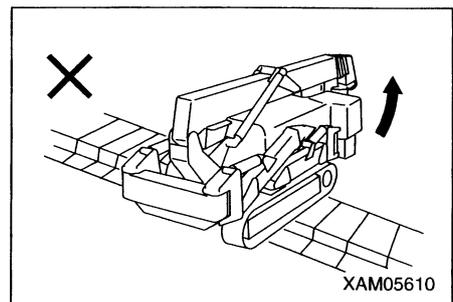
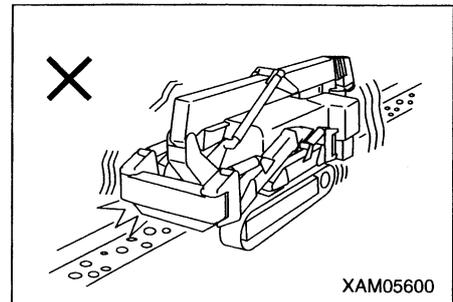
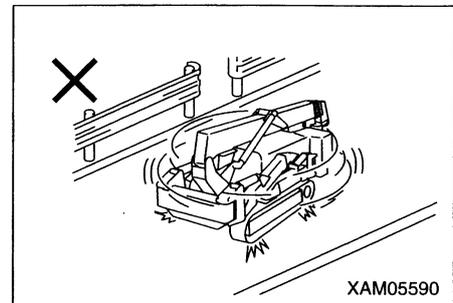
## 3.4 Rule for using it

### ⚠ WARNING

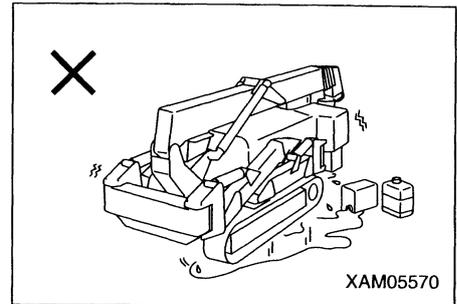
Unless following rules for using rubber track are observed, serious accident or damage to the rubber track may result.

Perform your work while observing or paying attention to the following.

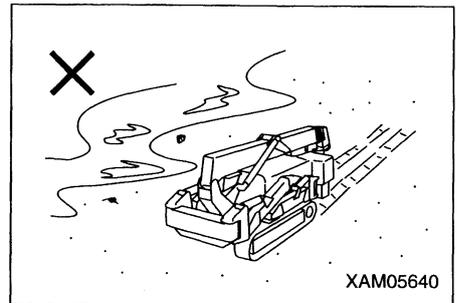
- Avoid making spin turn on concrete road surface. Rapidly changing travel direction will result in premature wear or damage of rubber track. Avoid it where possible.
- Do not operate the machine to rub rubber track edge against concrete ridge or wall.
- Avoid changing travel direction where pronounced bump or step exists.  
For going over bump, go at right angle to it. Going at angle may cause the rubber track to come off.
- Rubber track becomes very slippery on any wet steel plate, snow covered or frozen road surface. Be careful about slipping during travel or work on slope.



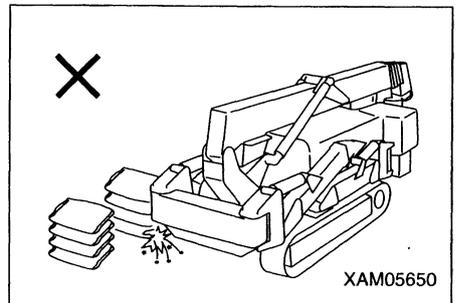
- Avoid the use of this machine depending on material to which it is exposed. After inevitable use, wash it clean with water.
- Working on such material that produces a oily compound when crushed (soybeans, corn, rape cake or the like) should be avoided.
- Working with salt, ammonium sulfate, potassium chloride, potassium sulfate, double super phosphate of lime, will corrode the adhesion of internal metal.



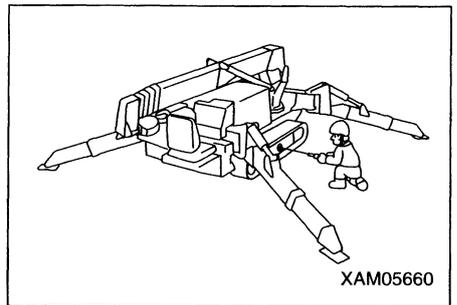
- Avoid use of this machine on beach or the like, because adhesion of internal metal will be corroded by salt.
- Work in extremely cold region causes nature of material of rubber track to change, shortening its service life. Rubber track should be used within the temperature range of  $-25$  to  $+55^{\circ}\text{C}$ , due to nature of rubber.



- When handling food products such as salt, sugar, wheat or soy beans, if deep scar exists on rubber track, broken pieces of wire or rubber may enter. Correct any damaged rubber portion before use.



- In order to prevent rubber track from coming off, always keep appropriate tension. Slack in the track may be a cause for its coming off.



## 4. Handling of Wire Rope

### 4.1 Standard for wire rope replacement

#### OUR ADVICE

- Standard for wire rope replacement is to be regarded common for all the ropes including those for winch, boom telescoping and wiring a load.
- Diameter of wire rope should be measured at the point where it passes sheave repeatedly and its mean value should be taken after measuring it from 3 directions.
- Even if it may have been out of service, old rope should not be used.
- For wire rope replacing procedure, see Part IV, 5.4 Irregular Service [9] Replacing the winch wire rope.
- For replacement or repair of wire rope, contact your dealer.

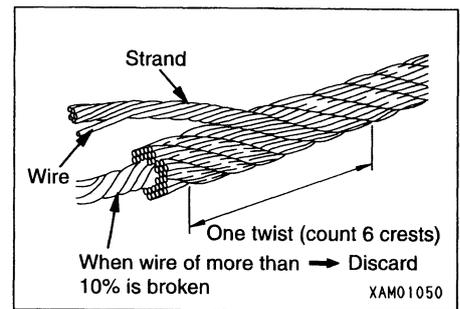
#### [1] Nominal dimensions of wire rope

- Wire rope for winch: IWRC 6 x Ws (26)%  
 $\phi 8 \times 73\text{m}$
- Wire rope for extending No.5 boom: IWRC 6 x Fi (29)  
 $\phi 8 \times 5.825\text{m}$
- Wire rope for retracting No.5 boom: IWRC 6 x Fi(29)  
 $\phi 6 \times 10.885\text{m}$

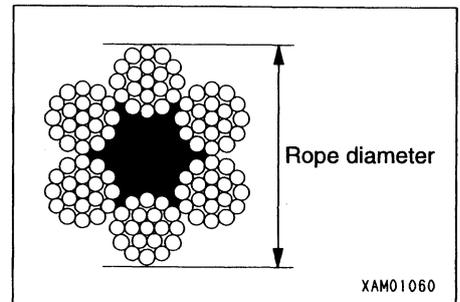
**[2] Standard for wire rope replacement**

Wire rope fatigues as the time elapses. Replace it when it falls on any of the following conditions:

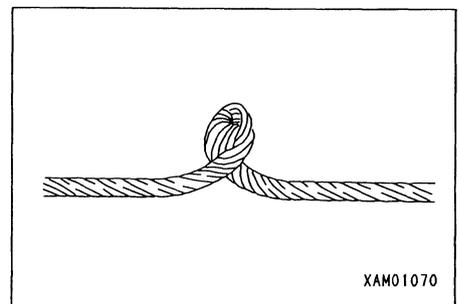
- Those with 10% or more of the wire in quantity (except for wire) broken over the one twist (count 6 strands) of the wire rope.
- ★ In case of the wire rope for winch and boom telescoping, replace it when 13 or more wires are broken.



- Those with 7% or more of nominal diameter worn.
- ★ Wire rope having diameter of 8mm should be replaced when it becomes 7.5mm.
- ★ Wire rope having diameter of 6mm should be replaced when it becomes 5.6mm.



- Those twisted with kinks having developed.
- Those extremely deformed or corroded.
- Those having abnormality at its end treatment.



## 4.2 Measures to take when winch wire rope is twisted

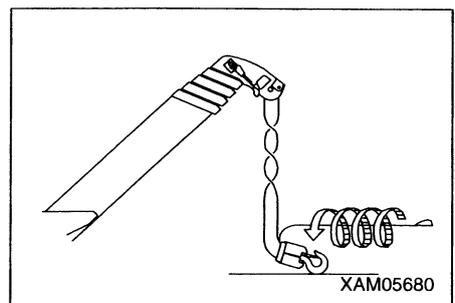
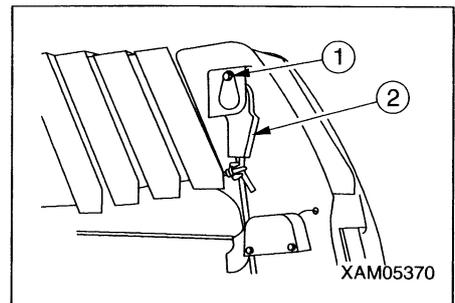
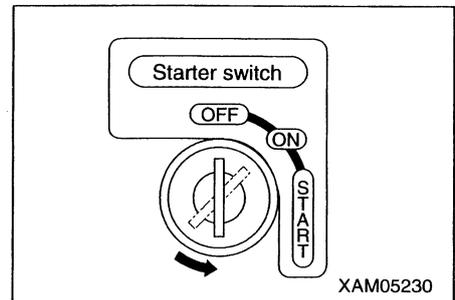
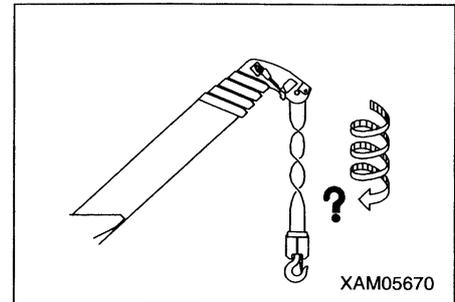
### OUR ADVICE

Occasionally alternate the take-up of wire rope so that hook block end and winch drum end are exchanged, which will extend its service life.

In case wire rope is twisted, correct it in the following manner:

1. Keeping the hook in normal, check the direction and number of the twist.
2. Push the winch lever forward to Lower position and ground the hook block.  
If unable to lower with winch, lower it by pushing the boom hoist lever forward to lower the boom or by pulling back the boom telescoping lever to retract it.
3. Turn the auxiliary starter switch to OFF position to shutdown the engine.
4. With wedge socket pin locking bolt ① removed, take off the wedge socket ②.
5. Forcibly twist the wire rope end in the opposite direction of hook block being twisted as checked in step 1 above (opposite to the direction to which it automatically tends to return when you take your hand off the wedge socket), by counting “n” times the number the hook block had been twisted, then fix it.
6. Start engine and pull back the boom hoist lever to hoist the boom to the maximum angle.
7. Push the boom telescoping lever forward to extend the boom to the maximum length.
8. Operate the winch lever and repeat hoisting and lowering of the hook block a few times.
9. Take up the wire rope orderly, while keeping tension applied to the rope.
10. Repeat above procedure until the twist is eliminated.

In case the twist can not be removed in spite of above procedure, replace it with new one.



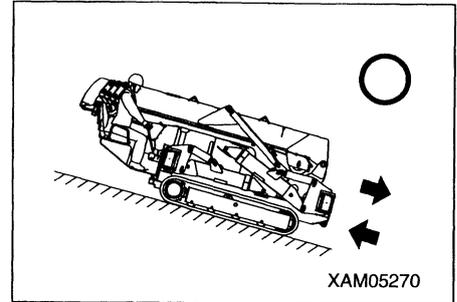
## 5. Transport

For transporting the machine, observe local laws and regulations.

### 5.1 Loading and unloading

#### **⚠ WARNING**

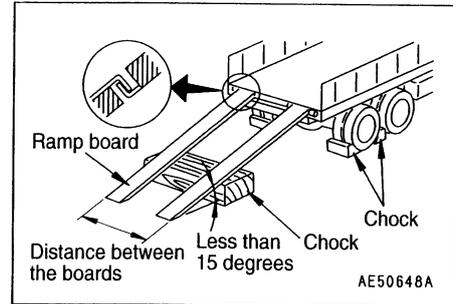
- Ramp board should be used with less than 15 degrees of inclination. See the distance between the boards to align them to the track gauge of the machine.
- For loading or unloading, let the machine assume Transport Position. See Part III Operation 2.5 Transport Position of the machine for detail.
- Loading should be carried out with the machine travelling forward. Doing it in reverse travel may cause tipping over.
- Unloading should be carried out with the machine travelling backward. Doing it with forward travel may lead to tipping over.
- Use particular care because the loading and unloading accompanies danger.
- Use the ramp board having sufficient width, length, thickness and strength to enable loading and unloading safely.
- Select level and hard ground and leave sufficient distance from road shoulder.
- Remove mud or dirt off undercarriage to prevent side skidding on ramp board. Also have the ramp board cleaned from deposit of grease, oil or ice.
- Never attempt to correct travel direction on ramp board. If you have to, get off the board and correct it.



### III OPERATION

For loading and unloading of the machine, let the machine assume Travel Position and be sure to use ramp board or dispatch platform and follow the instruction below:

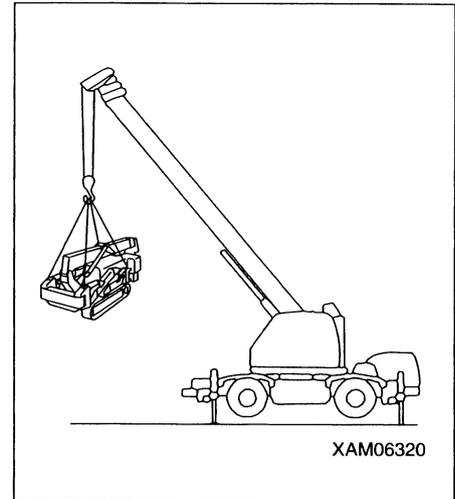
1. Engage brake of the truck and apply chocks to tires to prevent the truck from rolling.
2. Lock the ramp board firmly in such a manner as the centers of truck and machine are aligned.
  - ★ Make sure that height of each board is in equal.
3. Operate acceleration pedal and run the engine at low speed.
4. Travel slowly toward the ramp boards and load or unload using care not have the boom contact the truck. Load in reverse and unload in forward travel.
5. While on ramp board, do not operate any lever other than travel lever.
6. Load the machine at proper location on the truck bed.



## 5.2 How to lift the machine

### ⚠ WARNING

- Wire rope and hanging device such as shackle should have enough strength for the mass (weight) of the machine.
- For lifting, the machine should assume Travel Position. Location of center of gravity of the machine is designed with the machine in Travel Position. See Part III Operation 2.5 Travel Position of the machine for Travel Position.
- For transporting the crane with other crane in use, employ such transport devices as shown in sketch to the right for safe work.
- Do not lift the machine with any other procedure than shown hereunder. It may cause the balance to be lost.



### OUR ADVICE

- For operation of crane, official license may be required.
- For the mass (weight) of the machine, see Part V Data and Values
- Data and Values shown there are of standard specifications. Depending on installed attachment or options, proper lifting method may vary. Contact your dealer for detail.

**MC-305C** Total weight  
**3770kg**

349-4420900

Load per single line of  
 4 part hanging

**943kg**

349-4420300

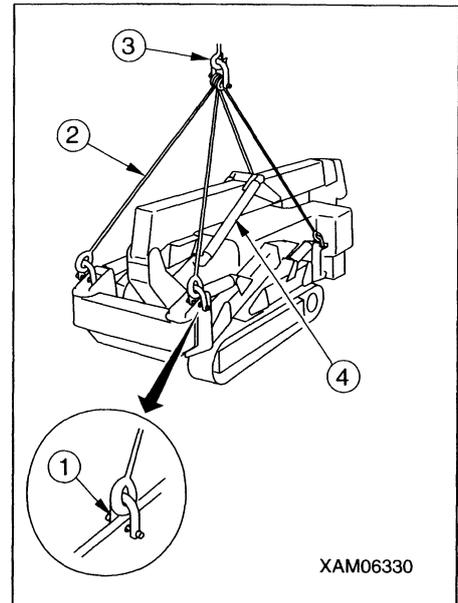
### III OPERATION

Lift the machine on hard and level ground and in the following manner:

1. Let the machine assume Travel Position as shown to the right.
2. Install shackles ① to each outrigger rotary holes (4 locations) and engage slings ② with hook ③.
3. Immediately after the machine is lifted off ground, wait for the machine to be stable before continuing to lift slowly.
4. When lifted, make sure that its position has not changed due to leakage from hydraulic circuit at head end of the hoist cylinder ④.

★ Recommended slings

- Wire ropes: 2 for front  
Equivalent to JIS13 rope or better. 12.5 dia. x 2150 long (breaking load: 7.5t or greater, with eye-lock at one end and nominal 12A thimble at the other end.
- Wire ropes: 2 for rear  
Equivalent to JIS13 rope or better. 12.5 dia. x 1650 long (breaking load: 7.5t or greater, with eye-lock at one end and nominal 12A thimble at the other end.
- Shackle  
Nominal 14 of BC or SC



### 5.3 Rules for loading

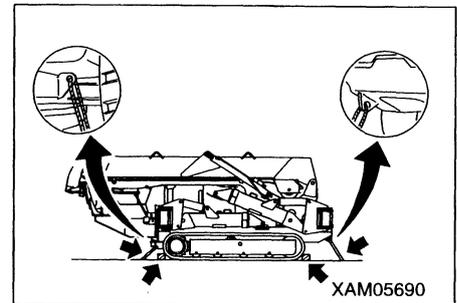
#### **⚠ WARNING**

For loading or unloading of the machine, select level and hard ground.

Also, have sufficient room from the road shoulder.

After loading the machine at designated location on truck bed, lock it in the following manner:

1. Stop engine and remove key of starter switch.
2. So that the machine does not move during transport, engage chocks to front and rear of rubber tracks and lock with chain or wire rope in use. Secure it firmly to prevent side skidding in particular.



### 5.4 Rules for transport

#### **⚠ WARNING**

Determine the route of transport with road width, vertical clearance and mass (weight) taken into consideration.

## 6. Handling in Cold Climate

### 6.1 Preparation for low ambient temperature

When temperature drops, starting deficiency, frozen coolant or the like develops. Take following measures:

#### [1] Lubricant

Replace lubricant for various components with low viscosity type. For specified viscosity, see Part IV Inspection and Services 5.1 Use of Lubricant in accordance with temperature, for detail.

#### [2] Battery

### **⚠ WARNING**

- **Battery generates inflammable gas which can explode. Do not allow any fire to approach.**
- **Electrolyte is dangerous. Prevent it from getting on your skin or eyes. If it should get on, wash it off with plenty of water and see doctor promptly.**

When temperature drops, so does the battery performance. When charge rate is low, electrolyte may be frozen. Keep the charge rate near 100% where possible and pay attention to insulation to have it ready for work on following day.

★ For charged rate, measure specific gravity for translation with the chart below:

|                 |     | Electrolyte temperature (°C) |      |      |      |
|-----------------|-----|------------------------------|------|------|------|
|                 |     | 20                           | 0    | -10  | -20  |
| Charge 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 |

**[3] Rules for after completion of work**

To prevent deficiency the following morning due to deposit of mud, water or frozen undercarriage, observe following rules:

- Remove mud or water deposited on the machine. Particularly, from hydraulic cylinder surface, dirt may be brought in together with water to damage the sealing.
- Park the machine on dry ground. If such surface is not available, place a plate on ground. It prevents freezing between ground and undercarriage, allowing to start immediately the next morning.
- Remove drain plug off fuel tank to drain residual water in fuel system to prevent freezing.
- Battery performance drops in low temperature. Battery should be covered or stowed in warm area to be re-installed the next morning.
- If electrolyte level is low, replenish with distilled water before starting your work the next morning. In order to prevent freezing during night, do not replenish after work.

**[4] When cold season is over**

With winter gone, when ambient temperature rises, take following measures:

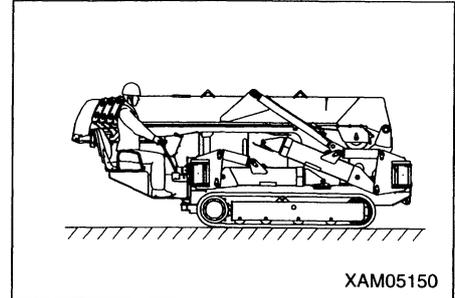
- Replace lubricant of various component with specified type, referring to Part IV 5.1 Use of lubricant in accordance with temperature, for detail.

## 7 Long Term Storage

### 7.1 Treatment prior to storage

#### **OUR ADVICE**

During long term storage, for protection of cylinder rods, let the machine assume Travel Position. See Part III Operation 2.5 Travel Position of the machine. (Prevention of corrosion on cylinder rod)



For long term storage, take following measures:

- Clean every portion before storing it indoors. To leave it outdoors inevitably, select flat area where it is not likely to incur disaster such as flood, and have it covered.
- Be sure to fill with fuel and lubricant and replace oil thoroughly.
- Disconnect negative terminal and cover battery or remove it from the machine and stow it away.

### 7.2 During storage

#### **⚠ WARNING**

**To run the machine indoors inevitably for prevention of corrosion, open window or door for improved ventilation to avoid gas intoxication.**

During storage, operate the machine at least monthly to prevent loss of oil film at lubricated area and charge battery as well.

### 7.3 After storage

#### **⚠ WARNING**

**If corrosion preventive operation has not been performed during long term storage, contact your dealer before starting to use the machine again.**

Before starting to use your machine after long term storage, take following measures:

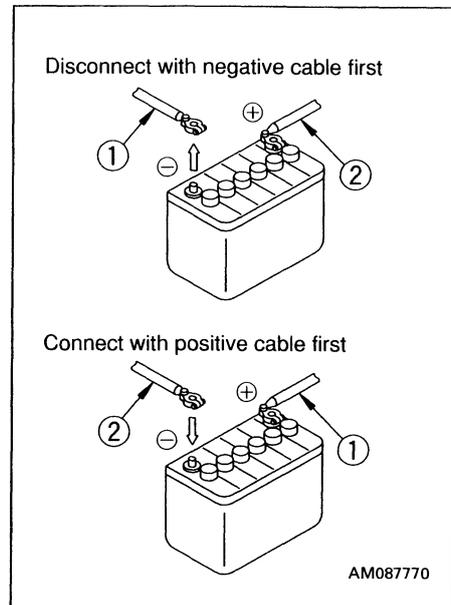
- Feed fuel, lubricate and replace oil thoroughly.
- With the cover removed (reinstall if the battery has been demounted from machine), check level and specific gravity of electrolyte before connecting battery cables, starting with positive side.
- Remove drain plugs off fuel tank, hydraulic oil tank and engine oil pan to drain residual water.
- Conduct pre-work inspection and warm-up run sufficiently while carefully checking various parts of the machine.

## 8 Handling of Battery

For handling the battery, observe following rules:

### ⚠ WARNING

- Inspection or other handling of your battery should be performed with engine shutdown and main starter switch key placed in OFF position.
- Electrolyte generates hydrogen gas which can explode. Do not allow lighted cigarette to approach and avoid any action that may cause spark.
- Electrolyte being dilute sulfuric acid, it damages your clothing or skin. If any of it gets on your clothing or skin, wash it off with plenty of water promptly. If it gets in eyes, immediately wash it out with water and see doctor for treatment.
- For handling battery, wear protective goggles and rubber gloves.
- Disconnect battery cables with the earthing end (normally negative (-) end) first and, to the contrary, connect with positive end (+) first. Touching with tool or the like between negative (-) terminal and positive (+) terminal is dangerous as it generates sparks.
- Loosened terminal may cause sparks to be generated due to deficient contact, resulting in explosion. Be sure to connect terminals securely.
- When replacing, fix it to prevent it from moving. Unless it is locked securely, terminal may be loosened for possible sparking.
- When de-mounting or mounting your battery, make sure of (+) and (-) terminals.



## 8.1 Rules for handling the battery

- Always be alert and do not allow battery to run down. Rather than charging it in a hurry after having discharged, measure the specific gravity of electrolyte on the earlier side and recharge it as necessary.

Maintaining your battery constantly well charged, will extend its service life.

- During hot season, check the electrolyte level more frequently than periodic inspection frequency.
- During cold season, battery capability drops remarkably. Maintain charge rate as close to 100% as possible and pay attention to insulation to make it ready to work the next morning.

Replenishment with distilled water should be carried out prior to starting the work the next morning, to avoid freezing.

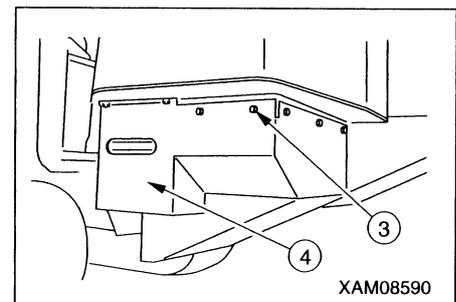
## 8.2 De-mounting and mounting the battery

### OUR ADVICE

After installing your battery, make sure that it does not move. If it does, lock it again.

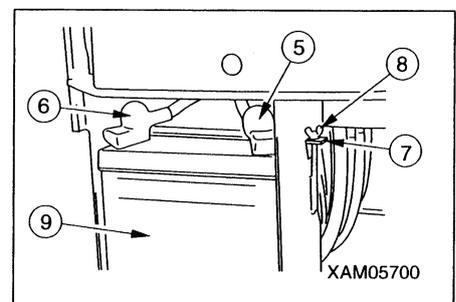
### [1] De-mounting

1. Remove mounting bolts ③ (x9) under the frame before taking off the cover ④.
2. Battery cables should be removed with (-) terminal ⑤, which is earthing end, first, followed by removal of (+) terminal ⑥.
3. With mounting nut ⑧ removed, remove battery mounting metalware ⑦, before removing the battery ⑨.



### [2] Mounting

1. Mount the battery with the de-mounting procedure reversed.
2. As for the battery cable, (-) terminal ⑤ which is earthing end should be connected last.



## 8.3 Rules for charging the battery

For charging with the battery as it is mounted:

- As alternator could be damaged with abnormal voltage applied to it, remove wiring for battery terminals before starting to charge.
- During charging, remove all the caps to allow gas to escape.
- In case battery is over-heated (with electrolyte temperature exceeding 45°C), suspend the charging for the time being.
- When charging is complete, discontinue to charge. Continuing to charge after its completion may cause;
  - (1) Over-heating of the battery
  - (2) Reduction of electrolyte volume
  - (3) Battery deficiency
- Do not connect battery cables in opposite (negative and positive). It may cause alternator to be damaged.
- For handling battery for any purpose other than electrolyte level check or its specific gravity measurement, be sure to disconnect battery cables beforehand.

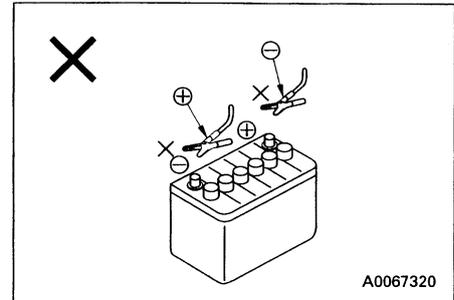
## 8.4 Starting with booster cables in use

For starting your engine with booster cables in use, follow the instruction below:

### [1] Rules for connecting and disconnecting booster cables

#### ⚠ WARNING

- When connecting cables, absolutely do not allow (+) and (-) terminals to contact each other.
- For starting with booster cables in use, wear protector goggles and rubber gloves.
- Do not allow normal and troubled machines to contact each other. Battery generates hydrogen gas and explosion may occur with sparks near the battery.
- Connect booster cables correctly. Final connection generates sparks. Connect it as far away from battery as practicable.
- When disconnecting booster cables, do not allow their clips to contact with each other or with the machine.



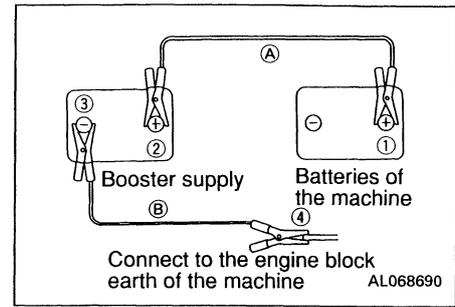
#### OUR ADVICE

- Use booster cable having such clip as the size of which is suitable for the size of battery.
- Battery on the normal machine should be of equal capacity with that on the troubled machine.
- Check the cables and clips for any damage or corrosion.
- Be sure to connect clips firmly.
- Make sure that levers of normal and troubled machine are all in Neutral position.

#### [2] Connecting the booster cables

Connect booster cables in accordance with the numbers shown in the diagram to the right.

1. Leave main starter switch on both normal and troubled machines at OFF position.
2. Connect one clip of booster cable (A) to (+) terminal of troubled machine.
3. Connect the other clip of booster (A) to (+) terminal of normal machine.
4. Connect one clip of booster cable (B) to (-) terminal of normal machine.
5. To engine block of troubled machine, connect the other clip of booster cable (B).



#### [3] Starting up the engine

### ⚠ WARNING

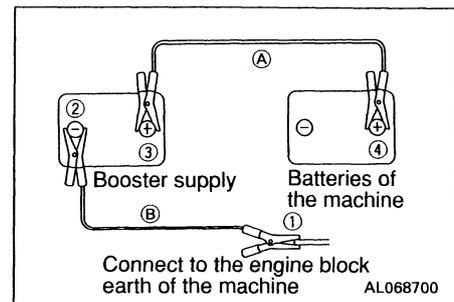
- Make sure that levers of normal and troubled machine are all in Neutral position.

1. Make sure that clips are firmly connected to battery terminals.
  2. Start up the engine of normal machine and bring it to maximum rotation.
  3. Turn the starter switch key of troubled machine to Start position to start up the engine. If it fails to start, wait for more than 2 minutes before attempting again.
- ★ For engine starting up procedure, see Part III Operation, 2.2 Starting up the engine.

#### [4] Disconnecting the booster cables

Once the engine has started, disconnect them with procedures for starting reversed.

1. Disconnect clip of booster cable (B) which has been connected to engine block of troubled machine.
2. Disconnect clip of booster cable (B) which has been connected to (-) terminal of normal machine.
3. Disconnect clip of booster cable (A) which has been connected to (+) terminal of normal machine.
4. Disconnect clip of booster cable (A) which has been connected to (+) terminal of troubled machine.



## 9. Measures to be Taken in Case of Abnormality

### 9.1 In connection with electrical components

- For the measures marked with ★ in the Measure column below, contact your dealer.
- In case any abnormality or cause other than shown hereunder is suspected, contact your dealer.

| Abnormality  | Major cause  | Measures to be taken                                     |
|--|--|--|
| Light is dull even with engine running at maximum speed  | ● Defective wiring                                       | ★ Check and correct loosened terminal and broken wiring. |
| Light flickers while engine is running                   | ● Alternator defective<br>● Wiring defective             | ★ Replace<br>★ Check and repair                          |
| Charge lamp does not go off even with engine in rotation | ● Alternator defective<br>● Wiring defective             | ★ Replace<br>★ Check and repair                          |
| Abnormal noise from alternator                           | ● Alternator defective                                   | ★ Replace  |
| Starter does not rotate with starter switch turned       | ● Wiring defective<br>● Battery charge level low         | ★ Replace<br>● Charge                                    |
| Starter pinion repeats to go in and come out (Whacks)    | ● Battery charge level deficient.                        | ● Charge   |
| Starter unable to rotate engine fast enough              | ● Battery charge level deficient.<br>● Starter defective | ● Charg<br>★ Replace                                     |
| Before starting engine, starter engagement comes off     | ● Wiring defective<br>● Battery charge level deficient.  | ★ Check and repair<br>● Charge                           |

### III OPERATION

## 9.2 In connection with the machine

- For the measures marked with ★ in the Measures column below, contact your dealer.
- In case abnormality or cause other than shown hereunder is suspected, contact your dealer.

| Abnormality   | Major cause   | Measures to be taken   |
|---|---|--|
| Crane totally unoperable but able to travel   | ● Crane control valve defective.  | ★ Inspect and repair   |
| <ul style="list-style-type: none"> <li>● Actuation speed slow for travel, boom and hook block</li> <li>● Hydraulic oil level low</li> </ul> | <ul style="list-style-type: none"> <li>● Oil level low</li> <li>● Hydraulic oil filter element clogged.</li> </ul>  | <ul style="list-style-type: none"> <li>● See "Pre-operation check" and replenish with oil</li> <li>● See Periodical Services and clean or replace</li> </ul> |
| Hydraulic oil temperature rises excessively   | <ul style="list-style-type: none"> <li>● Oil level low</li> <li>● Cooling fins clearances clogged with dust</li> </ul>  | <ul style="list-style-type: none"> <li>● See "Pre-operation check" and replenish with oil</li> <li>● Clean</li> </ul>  |
| <ul style="list-style-type: none"> <li>● Rubber track comes off</li> <li>● Sprocket wears abnormally</li> </ul>                             | ● Rubber track tension insufficient   | ● See Irregular Services and adjust the tension  |
| ● Impossible to operate outriggers.   | <ul style="list-style-type: none"> <li>● Rotary of the outriggers has not been rotated to the "Extended" position (outside)</li> <li>● Crane high speed selector switch remains depressed. (On radio controller and control panel)</li> </ul> | <ul style="list-style-type: none"> <li>● Lock the rotary at "Extended" Position.</li> <li>● Release the Crane High Speed switch.</li> </ul>                  |
| ● Impossible to operate crane or outriggers.  | ● Work Selector switch placed in "Travel" position.   | ● Place the Work Selector switch in "Outrigger" or "Crane" position.   |

### 9.3 In connection with engine

- For the measures marked with ★ in Measures column below, contact your dealer.
- In case abnormality or cause other than shown hereunder is suspected, contact your dealer.

| Abnormality                                    | Major cause  | Measures to be taken   |
|--|--|--|
| Engine fails to start even when starter turns. | <ul style="list-style-type: none"> <li>● Fuel insufficient</li> <li>● Battery charge level low</li> <li>● Compression insufficient</li> </ul>                | <ul style="list-style-type: none"> <li>● See Pre-operation Checks and replenish with fuel</li> <li>● Charge battery</li> <li>★ Check and replace</li> </ul>                |
| Engine starts, but stops immediately           | <ul style="list-style-type: none"> <li>● Oil level in oil pan low</li> </ul>   | <ul style="list-style-type: none"> <li>● See Pre-operation Checks and correct the situation</li> <li>● See cause and measures for Engine does not start</li> </ul>         |
| Engine output insufficient or drops gradually  | <ul style="list-style-type: none"> <li>● Air cleaner element clogged</li> <li>● Cooling fin clearance clogged</li> <li>● Compression insufficient</li> </ul> | <ul style="list-style-type: none"> <li>● See Irregular services and clean or replace</li> <li>● Clean</li> <li>★ Check and replace</li> <li>★ Check and replace</li> </ul> |



**Part IV  
Inspection and  
Maintenance Service**

|   |     |
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### 1. Rules for Conducting Service

In order to use this machine safely and without incurring trouble, fully understand the inspection and service items and method thereof described in this manual and perform your inspection and service accordingly.

#### **⚠ WARNING**

- Do not perform any inspection or service other than those described in this manual. Doing it under personal judgment may result in serious accident or trouble. When impossible to judge a level of defect or trouble, contact your dealer for repair.
- If any defect or trouble should be found during your use or as a result of inspection, report it to owner or responsible person and contact your dealer for repair.
- Inspection and service should be performed with the machine parked on level ground with good foothold.

#### **[1] Check the service meter**

Every day, read the service meter to check for any service item which may be due for periodical service.

#### **[2] Use genuine parts for replacement**

Use genuine parts specified by manufacturer for replacement.

#### **[3] Use genuine oil and grease for replacement**

Use genuine oil and grease. Also, use those having specified viscosity for ambient temperature.

#### **[4] Use clean oil and grease**

Use clean oil, grease as well as container and prevent dust from entering.

#### **[5] Keep the machine clean**

For easy detection of deficiency, machine should be kept clean. Particularly, keep grease fittings, breather and oil level gauge (inspection panel) clean and avoid dust from entering.

#### **[6] Pay attention to oil temperature**

Oil draining or filter replacement immediately after stopping work is dangerous. Wait for temperature to drop. When oil is cold, on the contrary, warm it (at about 20-40°C) before proceeding with such job.

#### **[7] Check the drained oil and filter**

After replacing oil and before changing the filter, check the drained oil and filter to make sure that metal particles or foreign matter is observed.

**[8] Care to be taken about feeding oil**

Wherever strainer is provided at filler port, do not feed oil with the strainer removed.

**[9] Pay attention to dust entering**

Check or replace oil in dust-free location and prevent trash from entering.

**[10] Affix caution plates**

When you have drained oil, in order to prevent engine from being started inadvertently by some one, affix a caution plate on travel control panel.

**[11] Observe cautions**

Observe content of caution plates affixed to the machine.

**[12] Care to be taken concerning welding repair work**

- Disconnect power supply (Turn off main starter switch)
- Install earthing within one meter of welding location.
- Use care not to allow any seal or bearing to enter between welding location and earthing. Spark may damage sealings.
- Avoid placing earth line near the boom pin or hydraulic cylinder. Spark may damage plated area.

**[13] Pay attention to fire**

Clean the parts, using non-inflammable cleanser or light oil. When using light oil, do not allow any fire to approach.

**[14] Keep mating surfaces clean**

When you disassembled where seal such as O-ring or gasket has been used, clean the mating surfaces and replace the seal with new one. Do not forget to install new O-ring or gasket.

**[15] Do not drop anything from your pockets**

For working while bending down with a cover opened, remove anything from your cloth pocket so you do not drop it through the opening.

**[16] Check the undercarriage**

When working on rocky surface, check for damage of undercarriage and loosened, cracked, worn or damaged bolt and nut and use the rubber track with less tension than normal.

**[17] Checking at the time of cleaning**

- Do not apply spray of mist to electric components and connector directly.
- Do not water control panels.
- For cleaning, while watering continually, wash down any dirt or dust using clean waste cloth or the like.

### [18] Verification and inspection before and after operation

In case of work in mud water, rain, snow or on the beach, before starting, check plugs and valves for tightness and after work clean the machine and check for crack, damage, loosened or missing bolt and nut. Lubrication should be performed on the earlier side. Particularly, pins of the machine which are immersed in mud water should be lubricated every day.

### [19] In dusty area...

For working in dusty area, following care should be taken:

- Check air cleaner more frequently for clogging.
- Clean and replace fuel filter on the earlier side.
- Clean electric components, starter and alternator in particular, to avoid accumulation of dust.

### [20] Do not mix oil

Using different brands and types of oil in mix should definitely be avoided. When replacing, replace them totally. Use genuine parts for replacement.

## 2. Basics of Service

### [1] Handling of oil

- Oil being used under extremely severe conditions (high temperature and high pressure) by engine and attachment, its deterioration progresses along with operating time. Be sure to use oil that meets such grade and temperature as described in the manual. Even if the oil is not dirty yet, be sure to replace at designated interval anyway.
- Oil corresponds to blood in human body. Use sufficient care to prevent impurity (water, metal powder, trash, etc.) from entering. Majority of machine trouble is attributable to entering of foreign matter. Be extra careful about impurity particularly during storage or at the occasion of refueling.
- Do not mix with any oil of different grade or brand.
- Fill oil to the specified level only. Either excessive or insufficient oil can be a cause for trouble.
- When oil for attachment becomes cloudy, entry of water or air into circuit is conceivable. Contact your dealer for remedy.
- When you replace oil, replace filter as well.
- At the time of factory shipment, ISO VG32 is in use for hydraulic system.  
Do not use any hydraulic oil not recommended by the manufacturer as it will cause clogging of filter. Mixing only small amount of oil remaining in piping and cylinder with other brand at the time of replacement will not really present a problem.

### [2] Storage of oil.

- Store oil indoors while using care not to allow impurity to be mixed such as water or trash.
- For long term storage in oil drum, place drums horizontally so that their openings are aligned laterally in line (for preventing suction of humidity). If you have to store outdoors, use care such as by covering them with waterproof sheet.
- In order to avoid change in quality, use them in the order in which they have been placed in stock.

### [3] Handling of grease

- Grease prevents development of galling and noise at joint.
- Any nipple not listed in Part V Periodical Service being only for the service and adjustment purpose, does not need greasing. If friction develops after long time of use, apply grease.
- Wipe off old grease clean as it is forced out after greasing. In such area where sand or dust is likely to get on to accelerate wear of rotational part, old grease must be wiped off with particular care.

### [4] Handling of filter

- Filter is an extremely important part of the system as it prevents foreign matter contained in oil, fuel or air circuit from entering essential system to cause trouble. Replace them periodically in accordance with instruction manual. In case of severe working circumstances or depending on type of oil, there are cases where replacement must take place within shorter interval.
- Never re-use any filter (cartridge type) even after cleaning it.
- When you replaced oil filter, check the used filter for deposit of metal powder or the like. If it is, contact your dealer.
- Package of replacement filter should not be opened until it is fitted.
- Be sure to use genuine filter only.

### [5] Handling electrical components and parts

- When it gets wet or its cover is broken, electrical component or parts is very dangerous because, due to resultant power leakage, the machine may go out of order or malfunction.
- Inspection and service includes the check of belt for proper tension or damage, and that of electrolyte level.
- Do not remove or disassemble any electric component mounted to the machine.
- Do not install any electric component other than those provided as optional.
- Do not allow any electric component to get wet when washing the machine, or in the rain.
- For working on the beach, intensify the service on electrical components to avoid corrosion.

### [6] Handling of hydraulic system

- Hydraulic system is heated during or immediately after work. During work, high pressure is applied to it as well. For inspection and service on hydraulic system, use care such as follows:
- Select level ground and let the machine assume Travel Position so that pressure is not applied to cylinder circuit.
- Be sure to shutdown the engine.
- Immediately after operation, temperature and pressure of hydraulic oil and lubrication oil are high. Wait for the oil temperature to drop before starting your service work..Even if temperature has dropped, be careful as there are cases where internal pressure remains. When loosening plug, screw or hose joint, avoid positioning yourself directly in front, and remove them by loosening slowly and gradually while letting the internal pressure to escape.
- For inspection and service of hydraulic system, be sure to bleed hydraulic oil tank and eliminate internal pressure.
- Inspection and service includes hydraulic oil level check, filter replacement and hydraulic oil replacement.
- When you remove high pressure hose or hydraulic piping, check O-ring for any scar or damage and replace as necessary.
- When you replace hydraulic hoses, do it one by one to avoid wrong installation.
- When you have replaced or cleaned the hydraulic oil filter element and strainer, or repaired or replaced the hydraulic equipment, or removed hydraulic piping, it is necessary to bleed the circuit internals.

### **3. Legally Required Inspection**

#### **3.1 Safety regulation on crane**

Check you local authority for the legal requirement. Generally however, following procedure is required for the purpose of such inspection:

1. Check safety systems for proper function.
2. Check hanging devices such as hook block for any abnormality.
3. Check winch wire rope end and wire clip for any damage.
4. If any defect is found on wire rope, replace it promptly.
5. Check hydraulic hose for leakage or surface damage due to friction. If any damage is found on surface, replace the hose.
6. Check structural part of boom for any crack or deformation.
7. Check for loosened or missing mounting bolts and joints.
8. Check boom extension, hoist and swing motions for proper actuation and stopping.

With inspection performed, if any deficiency should be found, contact your dealer.

## 4. Consumable Parts

Consumable parts including filter element and wire rope should be replaced at the time of periodical service or before their wearing limit. Use this machine economically by replacing consumable parts punctually. Use only genuine parts for replacement purpose. For ordering, refer to part numbers listed in parts catalog.

### List of consumable parts

| <b>Item</b>                 | <b>Hours for replacement</b> |
|-----------------------------|------------------------------|
| Hydraulic oil return filter | In every 500 hours           |
| Cylinder packing            | ★ In every 3 years           |
| Boom sliding plate          | In every 3 years             |
| Winch wire rope             | ★ In every 3 years           |
| Boom extending wire rope    | ★ Every 3 years              |
| Boom retracting wire rope   | ★ Every 3 years              |

★ Hours for replacement with ★ mark includes idle hours of machine.

★ For replacement of parts, contact your dealer.

## 5. Lubrication Oil and Grease

### 5.1 Applicable lubricants by ambient temperature

In accordance with ambient temperature, use lubricant in the following manner:

| Lubricating place    | Type of oil                  | Use by temperature (°C) |     |     |   |    |    |    |    |    |     | Specified capacity (liter) | Volume to replace (liter) |
|----------------------|------------------------------|-------------------------|-----|-----|---|----|----|----|----|----|-----|----------------------------|---------------------------|
|                      |                              | -30                     | -20 | -10 | 0 | 10 | 20 | 30 | 40 | 50 |     |                            |                           |
| Engine oil pan       | Engine oil                   |                         |     |     |   |    |    |    |    |    |     | 3.1                        | 3.1                       |
|                      |                              |                         |     |     |   |    |    |    |    |    |     |                            |                           |
|                      |                              |                         |     |     |   |    |    |    |    |    |     |                            |                           |
|                      |                              |                         |     |     |   |    |    |    |    |    |     |                            |                           |
| Hydraulic oil tank   | Wear resistant hydraulic oil |                         |     |     |   |    |    |    |    |    |     | 44                         | 44                        |
|                      |                              |                         |     |     |   |    |    |    |    |    |     |                            |                           |
|                      |                              |                         |     |     |   |    |    |    |    |    |     |                            |                           |
| Swing machinery case | Gear oil                     |                         |     |     |   |    |    |    |    |    | 0.6 | 0.6                        |                           |
| Final drive case     |                              |                         |     |     |   |    |    |    |    |    | 0.7 | 0.7                        |                           |
| Fuel tank            | Light oil                    |                         |     |     |   |    |    |    |    |    |     | 37                         | —                         |
|                      |                              |                         |     |     |   |    |    |    |    |    |     |                            |                           |
|                      |                              |                         |     |     |   |    |    |    |    |    |     |                            |                           |
| Cooling system       | Water                        | Add antifreeze          |     |     |   |    |    |    |    |    |     | 3.5                        | 2.4                       |

- “Specified oil capacity” means total capacity including the oil which fills piping for various systems, while “Volume to replace” represents volume of oil required for replacement at the time of inspection and service.
- For starting up engine at ambient temperature below 0°C, even if it is known that temperature during day rises to about 10°C, still be sure to use SAE10W-CD, SAE10W-30CD, SAE15W-40CD.
- For the wear resistant hydraulic oil for hydraulic systems (ISO VG46, VG32 and VG22), use the oil we recommend. When shipped out of our factory Super Highland 32 is in use.

When ambient temperature drops below -10°C, adjust concentration in accordance with 8.4 Irregular Service, Cleaning the cooling system internals.

**5.2 Recommended brands of lubricant**
**[1] Wear resistant hydraulic oil**

| Supplier \ Viscosity grade (ISO) | VG46                                       | VG32                                       |
|----------------------------------|--|--|
| 出光興産                             | ダフニースーパーハイドロ 46<br>ダフニースーパーハイドロ LW46       | ダフニースーパーハイドロ 32<br>ダフニースーパーハイドロ LW32       |
| コスモ石油                            | コスモハイドロ AW46<br>コスモハイドロ HV46               | コスモハイドロ AW32<br>コスモハイドロ HV32               |
| 日本石油                             | スーパーハイランド 46<br>スーパーハイランド Z46              | スーパーハイランド 32<br>スーパーハイランド Z32              |
| Shell                            | Tellus oil<br>Tellus oil                   | Tellus oil 32<br>Tellus oil K32            |
| ジャパンエナジー                         | ハイドラックス 46<br>ハイドラックス ES46                 | ハイドラックス 32<br>ハイドラックス ES32                 |
| Esso                             | Uni Power<br>Uni Power                     | Uni Power SQ32<br>Uni Power XL32           |
| Mobile                           | Mobile DTE25<br>Hydraulic ZF46             | Mobile DTE24<br>Hydraulic ZF32             |
| 三菱石油                             | ダイヤモンドハイドロフルード EP46<br>ダイヤモンドハイドロフルード TS46 | ダイヤモンドハイドロフルード EP46<br>ダイヤモンドハイドロフルード TS46 |
| General                          | Panol46<br>Hydfluid AW46                   | Panol32<br>Hydfluid AW32                   |
| キグナス石油                           | ユニットオイル WR46                               | ユニットオイル WR32                               |

**[2] Gear oil**

| Supplier \ Viscosity grade (ISO) | VG320 (JIS Gear oil Type 2 No.6) |
|----------------------------------|----------------------------------|
| 出光興産                             | ダフニースーパーギヤオイル 320                |
| コスモ石油                            | コスモギヤー SE 320                    |
| 日本石油                             | ボンノック M 320                      |
| Shell                            | Omala oil 320                    |
| ジャパンエナジー                         | レダクサス 320、M320、ES ギヤー-G 320      |
| Esso                             | Spartan EP320                    |
| Mobile                           | Mobile gear 632                  |
| 三菱石油                             | ダイヤモンドハイドロフルード 632               |
| General                          | General SP Gear roll 320         |

[3] Grease

| Supplier \ Viscosity grade | Lithium grease                | Molybdenum disulfide grease |
|----------------------------|-------------------------------|-----------------------------|
| 出光興産                       | ダフニーコロネックスグリースEP2             | ダフニーグリースM-2                 |
| コスモ石油                      | コスモグリースダイナマックスEP2             | モリブデングリース2                  |
| 日本石油                       | エピロックグリースAP2<br>パイロロックユニバーサル2 | ニューモリロックグリース2               |
| Shell                      | Albania EP grease2            | Lithinux AM                 |
| ジャパンエナジー                   | リゾニックスグリースEP2                 | リゾニックスグリース M-2              |
| Esso                       | Lithtan EP2                   | Pecon Q - 2                 |
| Mobile                     | Mobilux EP2                   | Mobile grease special       |
| 三菱石油                       | ダイヤモンドマルチパーパスEP2              | ダイヤモンドマルチパーパス M-2           |
| General                    | Gemico grease ME2             | Gemico grease MD2           |

- ★ Molybdenum disulfide should be used for top side of boom slide plate as well as for each side and bottom of the boom.
- ★ Do not pack swing bearing with Molybdenum disulfide grease.

**[2] Bolt marked [10.9] (strength classification) on its head:**

| Nominal<br>a (mm) | Width across<br>flats b (mm) | Tightening torque {N · m (kgf · m)} |                           |
|-------------------|------------------------------|-------------------------------------|---------------------------|
|                   |                              | Target value                        | Allowance                 |
| 6                 | 10                           | 11.0 (1.1)                          | 9.4 ~ 12.7 (0.93 ~ 1.26)  |
| 8                 | 13                           | 27.0 (2.7)                          | 23.0 ~ 31.1 (2.3 ~ 3.10)  |
| 10                | 17                           | 53.0 (5.4)                          | 45.0 ~ 61.0 (4.6 ~ 6.21)  |
| 12                | 19                           | 93.0 (9.5)                          | 79.0 ~ 107 (8.10 ~ 10.9)  |
| 14                | 22                           | 148 (15.1)                          | 126 ~ 170 (12.8 ~ 17.4)   |
| 16                | 24                           | 231 (23.5)                          | 196 ~ 266 (20.0 ~ 27.0)   |
| 18                | 27                           | 317 (32.3)                          | 269 ~ 365 (27.5 ~ 37.1)   |
| 20                | 30                           | 450 (45.9)                          | 383 ~ 518 (39.0 ~ 52.8)   |
| 22                | 32                           | 612 (62.4)                          | 520 ~ 704 (53.0 ~ 71.8)   |
| 24                | 36                           | 778 (79.3)                          | 661 ~ 895 (67.4 ~ 91.2)   |
| 27                | 41                           | 1,130 (116)                         | 961 ~ 1,300 (98.6 ~ 133)  |
| 30                | 46                           | 1,540 (158)                         | 1,310 ~ 1,770 (134 ~ 182) |
| 33                | 50                           | 2,100 (214)                         | 1,790 ~ 2,410 (182 ~ 246) |
| 36                | 55                           | 2,700 (275)                         | 2,300 ~ 3,100 (234 ~ 316) |

**[3] Bolt marked [12.9] (strength classification) on its head:**

| Nominal<br>a (mm) | Width across<br>flats b (mm) | Tightening torque {N · m (kgf · m)} |                           |
|-------------------|------------------------------|-------------------------------------|---------------------------|
|                   |                              | Target value                        | Allowance                 |
| 6                 | 10                           | 13.0 (1.30)                         | 11.1 ~ 15.0 (1.11 ~ 1.50) |
| 8                 | 13                           | 31.5 (3.20)                         | 26.8 ~ 36.2 (2.72 ~ 3.70) |
| 10                | 17                           | 62.5 (6.40)                         | 53.1 ~ 71.9 (5.44 ~ 7.35) |
| 12                | 19                           | 109 (11.1)                          | 92.7 ~ 125 (9.44 ~ 12.8)  |
| 14                | 22                           | 174 (17.7)                          | 148 ~ 200 (15.0 ~ 20.4)   |
| 16                | 24                           | 271 (27.7)                          | 230 ~ 312 (23.5 ~ 31.9)   |
| 18                | 27                           | 373 (38.1)                          | 317 ~ 429 (32.4 ~ 43.8)   |
| 20                | 30                           | 529 (54.0)                          | 450 ~ 608 (45.9 ~ 62.1)   |
| 22                | 32                           | 720 (73.4)                          | 612 ~ 828 (62.4 ~ 84.4)   |
| 24                | 36                           | 915 (93.3)                          | 778 ~ 1,050 (79.3 ~ 107)  |
| 27                | 41                           | 1,340 (136)                         | 1,140 ~ 1,540 (116 ~ 156) |
| 30                | 46                           | 1,820 (185)                         | 1,550 ~ 2,090 (157 ~ 213) |
| 33                | 50                           | 2,470 (252)                         | 2,100 ~ 2,840 (214 ~ 290) |
| 36                | 55                           | 3,180 (324)                         | 2,700 ~ 3,660 (275 ~ 373) |

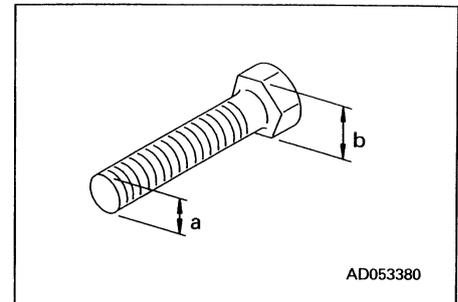
## 6. Standard Tools and Standard Tightening Torque

### 6.1 Inquiry on standard tools

If and when tool is required for inspection and service purpose, contact your dealer.

### 6.2 List of standard tightening torque

Tighten metric threaded bolts and nuts with torque shown below, unless specifically indicated. Determine appropriate tightening torque according to width across flats (b) of bolts and nuts.



#### [1] Bolt marked [8.8] (strength classification) at its head

| Nominal<br>a (mm) | Width across<br>flats b (mm) | Tightening torque {N · m (kgf · m)} |                           |
|-------------------|------------------------------|-------------------------------------|---------------------------|
|                   |                              | Target value                        | Allowance                 |
| 6                 | 10                           | 7.8 (0.80)                          | 6.8 ~ 9.0 (0.70 ~ 0.92)   |
| 8                 | 13                           | 19.0 (1.95)                         | 16.5 ~ 21.9 (1.70 ~ 2.24) |
| 10                | 17                           | 37.5 (3.85)                         | 32.6 ~ 43.1 (3.35 ~ 4.43) |
| 12                | 19                           | 65.5 (6.70)                         | 57.0 ~ 75.3 (5.85 ~ 7.70) |
| 14                | 22                           | 104 (10.6)                          | 90.4 ~ 120 (9.2 ~ 12.2)   |
| 16                | 24                           | 163 (16.6)                          | 142 ~ 187 (14.4 ~ 19.1)   |
| 18                | 27                           | 224 (22.8)                          | 195 ~ 258 (19.8 ~ 26.2)   |
| 20                | 30                           | 318 (32.4)                          | 277 ~ 366 (28.2 ~ 37.3)   |
| 22                | 32                           | 432 (44.0)                          | 376 ~ 497 (38.3 ~ 50.6)   |
| 24                | 36                           | 549 (56.0)                          | 477 ~ 631 (48.7 ~ 64.4)   |
| 27                | 41                           | 804 (81.9)                          | 699 ~ 925 (71.2 ~ 94.2)   |
| 30                | 46                           | 1,090 (111)                         | 948 ~ 1,250 (96.5 ~ 128)  |
| 33                | 50                           | 1,485 (151)                         | 1,290 ~ 1,710 (131 ~ 174) |
| 36                | 55                           | 1,910 (194)                         | 1,660 ~ 2,200 (167 ~ 223) |

## IV INSPECTION AND MAINTENANCE SERVICE

### [4] Other bolts

| Nominal<br>a (mm) | Width across<br>flats b (mm) | Tightening torque {N · m (kgf · m)} |                           |
|-------------------|------------------------------|-------------------------------------|---------------------------|
|                   |                              | Target value                        | Allowance                 |
| 6                 | 10                           | 3.0 (0.30)                          | 2.6 ~ 3.5 (0.26 ~ 0.35)   |
| 8                 | 13                           | 7.5 (0.75)                          | 6.5 ~ 8.6 (0.65 ~ 0.85)   |
| 10                | 17                           | 14.5 (1.45)                         | 12.6 ~ 16.7 (1.25 ~ 1.65) |
| 12                | 19                           | 25.0 (2.55)                         | 21.7 ~ 28.8 (2.20 ~ 2.95) |
| 14                | 22                           | 40.0 (4.10)                         | 34.8 ~ 46.0 (3.55 ~ 4.70) |
| 16                | 24                           | 62.5 (6.40)                         | 54.3 ~ 71.9 (5.55 ~ 7.35) |
| 18                | 27                           | 86.0 (8.75)                         | 74.8 ~ 98.9 (7.60 ~ 10.0) |
| 20                | 30                           | 122 (12.4)                          | 106 ~ 140 (10.8 ~ 14.3)   |
| 22                | 32                           | 166 (16.9)                          | 144 ~ 191 (14.7 ~ 19.4)   |
| 24                | 36                           | 211 (21.5)                          | 183 ~ 243 (18.7 ~ 24.7)   |
| 27                | 41                           | 309 (31.4)                          | 269 ~ 355 (27.3 ~ 36.1)   |
| 30                | 46                           | 419 (42.6)                          | 364 ~ 482 (37.0 ~ 49.0)   |
| 33                | 50                           | 570 (58.0)                          | 495 ~ 656 (50.4 ~ 66.7)   |
| 36                | 55                           | 732 (74.5)                          | 636 ~ 842 (64.8 ~ 85.7)   |

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## IV INSPECTION AND MAINTENANCE SERVICE

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## **8. Working Procedure**

### **8.1 First 10 hour service (First time of new machine only)**

For the first time of new machine only, perform following service after 10 hours of operation:

#### **[1] Greasing various part of the crane**

For the location and method, see 8.8 Service in every 250 hours.

### **8.2 First 50 hour service (First time of new machine only)**

For the first time of new machine only, perform following service after 50 hours of operation:

#### **[1] Replacement of oil in hydraulic oil tank and filter element**

For the location and method, see 8.9 Service in every 500 hours and 8.10 Service in every 1000 hours.

### **8.3 First 250 hour service (First time of new machine only)**

For the first time of new machine only, perform following service after 250 hours of operation:

#### **[1] Replacement of fuel filter cartridge**

For the location and method, see 8.9 Service in every 500 hours.

#### **[2] Replacement of engine oil and filter cartridge**

For the location and method, see 8.9 Service in every 500 hours.

#### **[3] Check and adjustment of engine valve clearances**

For the location and method, see 8.11 Service in every 2000 hours.

#### **[4] Replacement of oil in swing machinery case**

For the location and method, see 8.10 Service in every 1000 hours.

#### **[5] Replacement of oil in final drive case**

For the location and method, see 8.10 Service in every 1000 hours.

### 8.4 Irregular service

#### [1] Check, cleaning and replacement of air cleaner

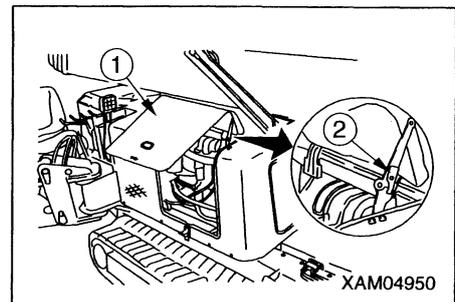
#### **⚠ WARNING**

- Do not clean or replace air cleaner while engine is running. It may cause trouble in engine.
- When you use compressed air for cleaning the element, wear goggles because dust flies all over which may enter and damage your eyes.

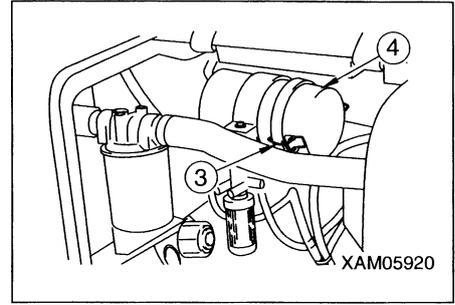
#### **OUR ADVICE**

- Air cleaner should be cleaned with the interval of 20 to 30 hours as a guide. If the machine was used in dusty area, clean the air cleaner after such work or at the next pre-work inspection.
- For cleaning air cleaner, do not tap it or hit it against something.
- Do not use such element as its pleat, gasket or seal is damaged.
- Replace element with new one after one year of use.
- Use genuine element only.

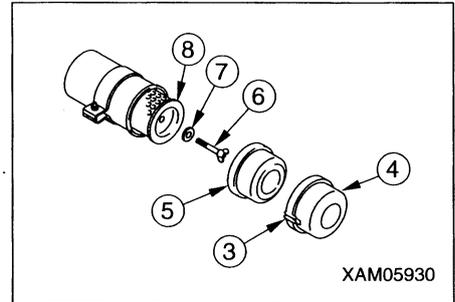
1. Pull back the knob to open engine hood ① and slide the lock ② of stay to lock it securely.



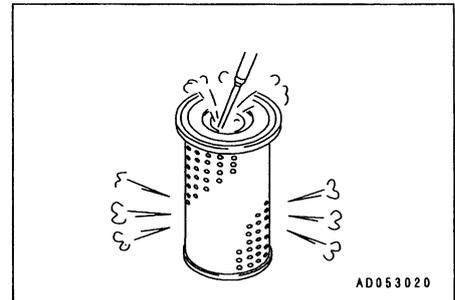
2. With clamps ③ removed (at 2 locations), take out dust pan ④ and rubber cup ⑤.



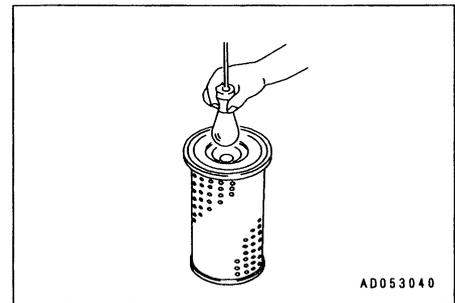
3. Loosen the center bolt ⑥ and remove it together with seal washer ⑦.  
 4. Pull out the element ⑧.  
 5. Cover the duct hole at the back of air cleaner body with clean cloth or tape to prevent dust from entering.



6. Clean the air cleaner body internals.  
 7. Blow dry compressed air (0.69Mpa:7kgf/cm<sup>2</sup> or lower) along pleats from inside of the element. Then blow along pleats from outside, before blowing from inside again.  
 ★ Element should be replaced after 5 cleanings or one year of service.



8. After cleaning, use an electric bulb to check the inside of element and replace the element if small holes or thin area is found.



9. Remove cloth or tape cover placed on the air connector side at the back of air cleaner body.  
 10. Set the cleaned element ⑧ and lock it with center bolt ⑥ in use. (The center bolt tightening torque: 4.90-5.88N.m: 0.50-0.6kgf.m)  
 ★ Reinstall the air cleaner with the removing procedure reversed.  
 11. Close engine hood ① with the reversed procedure.

### [2] Check of electrolyte level

#### ⚠ WARNING

- Battery generates inflammable gas which may explode. Do not allow any fire to approach.
- Electrolyte is dangerous. Do not allow it to get in your eyes or on skin. If it has got on, wash it off with plenty of water and see doctor for treatment.
- Do not replenish with electrolyte in excess of its maximum level line indicated. It may cause fire when it leaks.

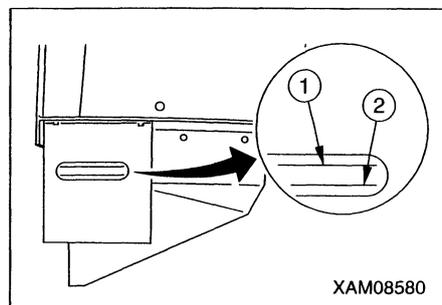
#### OUR ADVICE

- Keep the top surface of battery clean by wiping with wet cloth.
- When required to replenish with distilled water, in order to avoid freezing, do it before starting your work the following morning.

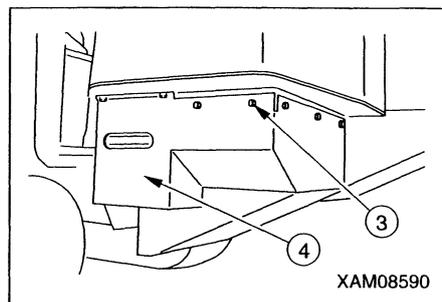
1. Check the electrolyte level by looking through the side of battery case.

★ Clean the battery case if it has been smeared.

2. Check that the electrolyte is up to the maximum level line ①.



3. If electrolyte is insufficient, with the mounting bolts ③ (x9) removed, take off the cover ④.



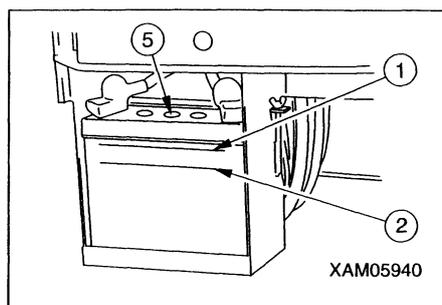
4. If not, remove all the battery caps ⑤ (x6) and replenish up to the maximum level ①.

★ If electrolyte is spilled, refill with dilute sulfuric acid.

5. Check breather hole of battery cap ⑤, clean any clogged cap before tightening securely.

6. This completes the check. Reinstall the cover ④.

★ See Part III Operation, 1.5 Machinery Cover for reinstallation procedure.

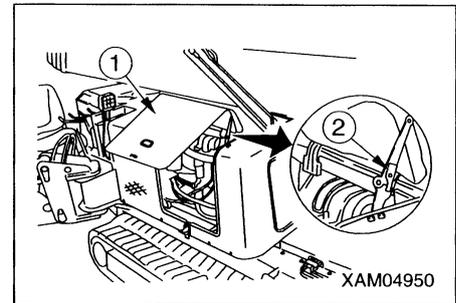


[3] Checking and cleaning the water separator

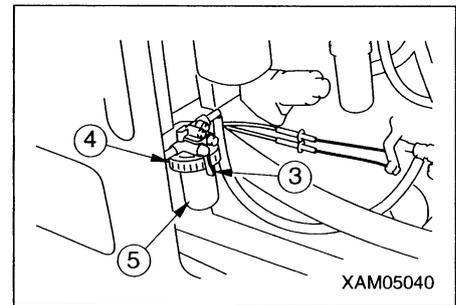
**OUR ADVICE**

Residual water or dust in the water separator pot will be a cause for engine deficiency. Check and clean the pot internals if water or dust is remaining.

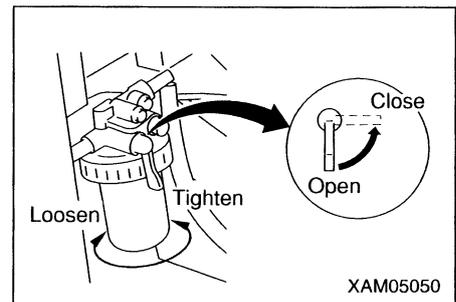
1. Open engine hood ① with knob pulled back and slide the rock ② of stay to lock it firmly.



2. Check the water separator pot ⑤ visually and if water or settlement is seen, clean the internals.
3. If water or any other dust should be found remaining in the water separator pot, clean the pot internals in the following manner:



- (1) Turn the fuel lever ③ to horizontal position (Closed) to stop fuel flow.
- (2) Turn the retainer ring ④ counterclockwise to loosen it, before removing the water separator pot ⑤.
- (3) Cleanse the water separator pot ⑤ with light oil and blow compressed air (0.20~0.29Mpa{2-3kgf/cm2}) to its internals to remove surface dust.
- (4) Replace the water separator pot ⑤ to original position and return the fuel lever ③ to vertical position (Open).



4. Close the engine hood ① with the procedure reversed..

**[4] Cleaning the cooling system internals**

**⚠ WARNING**

- Right after engine has been in operation, coolant is hot and draining it may cause scalding. Wait until the engine cools down.
- This cleaning is performed while engine is running. Standing behind the machine is dangerous if the machine starts to move. Further, if you leave the engine hood open, there will be a risk of you touching fan.
- While coolant is hot, do not remove the cap. It may cause hot water to gush. With the temperature having dropped, if you are to remove the cap, rotate it slowly to let the pressure escape.

Perform coolant system cleaning and coolant replacement in accordance with the chart below:

| Type of anti-freeze             | Cooling system cleaning and coolant replacement                       |
|---------------------------------|---|
| Anti-corrosion, all season type | Every other year (in fall) or every 4000 hours, whichever falls first |
| All season type                 | Every year (in fall) or 2000 hours, whichever comes first.            |
| One winter season type          | Biannually (Spring and fall). Anti-freeze to be added in fall only.   |
| Where anti-freeze is not used   | Biannually or every 1000 hours, whichever comes first                 |

Park the machine on level land for the cleaning and replacement.

Mixing ratio depends on local temperature but in order to secure anti-corrosion effect, 30% by volume is the minimum.

To determine the ratio of mixing anti-freeze in water, find out the lowest local temperature experienced in the past and use the Chart of Water and Anti-freeze Mixing Ratio shown below. In practice, set the temperature for about 10°C below the minimum temperature experienced.

Chart of Water and Anti-freeze Mixing Ratio

|                         |                         | Minimum (°C) |     |     |
|-------------------------|-------------------------|--------------|-----|-----|
|                         |                         | -15~         | -20 | -25 |
| Mixing quantity (liter) | Quantity of Anti-freeze | 1.1          | 1.2 | 1.5 |
|                         | Quantity of water       | 2.5          | 2.3 | 2.0 |

**⚠ WARNING**

**Anti-freeze is inflammable. Use care about fire.**

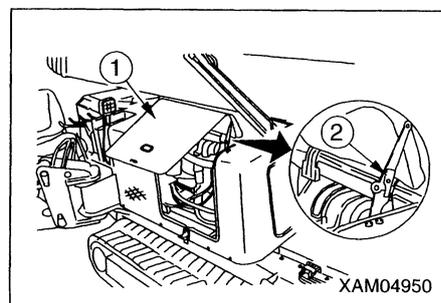
Use city water for coolant. If river or well is the only available water source, contact your dealer. It is recommended that mixing ratio is controlled using anti-freeze concentration meter.

**⚠ WARNING**

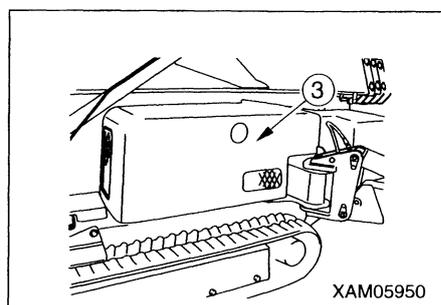
**For removing drain plug, be careful not to splash anti-freeze mixed water over yourself.**

- Have a container having a capacity of 4 liters ready for receiving anti-freeze mixture.
- Have a hose ready for watering.

1. Pull back the knob to open engine hood ① and slide the lock ② of stay to lock it securely.

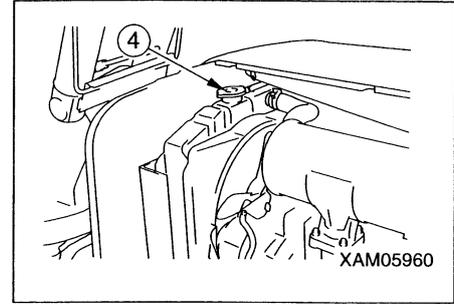


2. Remove engine cover ③ mounting bolt (x17) at the left side and remove the engine cover ③.

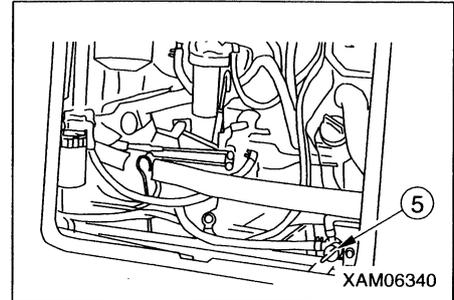


## IV INSPECTION AND MAINTENANCE SERVICE

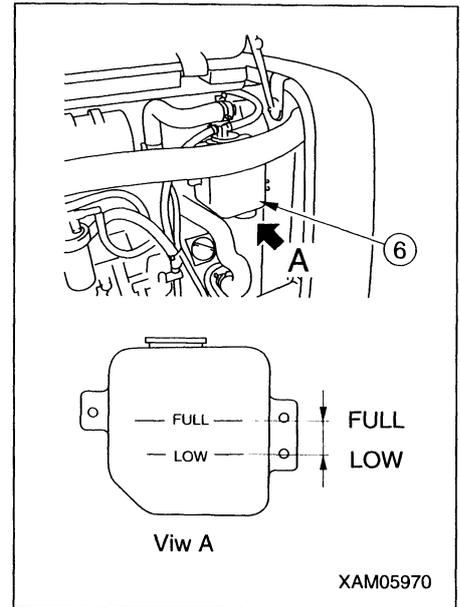
3. Turn the radiator cap ④ slowly until it hits stopper to let the pressure escape.
4. Further, while depressing, turn the radiator cap ④ until it hits the stopper.



5. Place a container underneath the drain cock ⑤ to receive antifreeze mixture.
6. Open drain cock ⑤ at the bottom of radiator and drain coolant.
7. After draining, close the drain cock ⑤ and feed city water.
8. After opening the drain cock ⑤, let engine run at idling speed to continue this cleaning operation with flowing water for 10 minutes. While cleaning with flowing water, adjust the water flow of feed and drain so the radiator remains full constantly. During this cleaning operation, always watch that watering hose does not come off the radiator cap.
9. After cleaning with water flow, stop engine to stop the water feed, and after draining, close the drain cock ⑤.
10. After draining, clean the radiator with cleanser in use.
11. After cleaning, open the drain cock ⑤ and drain water completely before filling it again with city water to the vicinity of filler port.
12. When the radiator is filled to the vicinity of filler port, with the drain cock ⑤ opened, run the engine at idling speed to continue this cleaning with flowing water until clear water comes out. While cleaning with flowing water, adjust the water flow of feed and drain so that the radiator constantly remains to be full.
13. When clean water comes out, stop engine and close drain cock ⑤.
14. Through the filler port, feed anti-freeze and city water up to the filler port. Determine the ratio of mixture in accordance with said chart of Water and Anti-freeze Mixing Ratio.



15. In order to de-aerate the coolant, run the engine at low-idling speed for 5 minutes, before running it further at high-running speed (have the filler port cap removed during this operation).
16. Drain coolant from sub-tank ⑥ and clean its internals before filling it with coolant to midway between Full and Low marks.
17. Stop engine and after about 3 minutes, feed water up to the vicinity of filler port before tightening the cap ④. Close engine hood ① and ③ with the reversed procedure.



### [5] Cleaning and checking the radiator fins

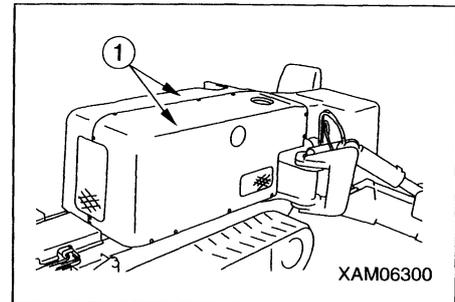
#### **⚠ WARNING**

Being hit by compressed air, steam or water may result in your external injury. Wear goggles, respirator, safety shoes or the like.

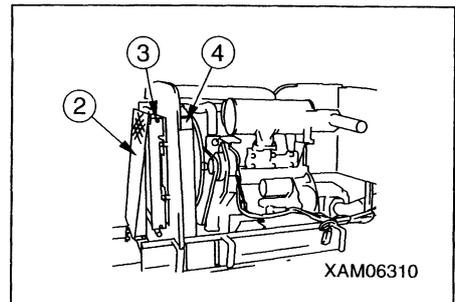
#### **OUR ADVICE**

In order to avoid damaging fins, use compressed air while keeping the nozzle away from fin. Damaged fins will be a cause for water leakage or over-heating. In dusty job site, check the fins every day regardless of servicing interval.

1. With mounting bolts (x24) of engine cover ① on each side removed, take off the hood ①.



2. With mounting bolts (x2) of radiator guard ② removed, take off the guard ②.
3. Blow compressed air (0.20-0.29MPa:2-3 kgf/cm<sup>2</sup>) to oil cooler ③ and radiator ④ to remove dirt and trash which have been clogging the fin.
4. After completion of the cleaning, reinstall the engine cover ① on each side and radiator guard ②.



[6] Check and adjustment of rubber track

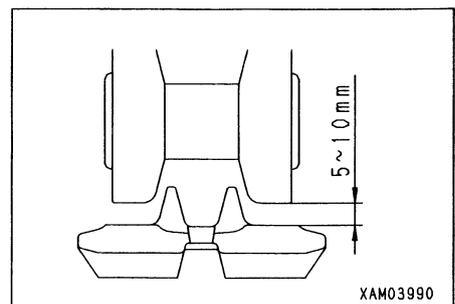
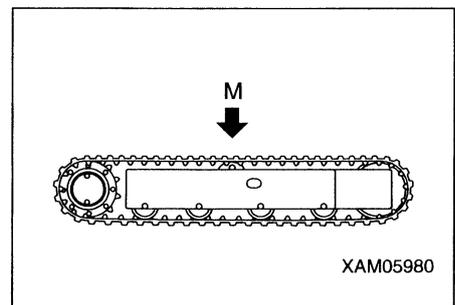
**OUR ADVICE**

- For performing rubber track check and adjustment, set up outrigger and lift the machine so that its tracks are about 50mm off the ground.
- Tension of rubber track is normal, if the clearance between bottom of track roller and shoulder of track is 5 to 10mm at midway.
- In case track is loose even after packing the grease, it will be necessary to replace the rubber track or the seal of tension adjust cylinder. For the judgment of whether to replace, repair or continue to use the existing track, contact your dealer.

Because the progress of rubber track wear will vary depending on working conditions or ground, always watch the wear and tension. Particularly in case new machine or new track has been installed, after adjusting the tension to specified value, keeping to travel for 5 to 30 hours will cause initial slack to develop. Until such initial slackening period elapses, tension adjustment has to be carried out diligently. It helps avoid track coming off due to lack of tension.

**[Checking the tension]**

1. Move the machine so that joint (M mark) of rubber track comes over the center between the shafts.
2. Set up outrigger and lift the track by about 50mm off the ground.
  - ★ For outrigger setting up procedure, see Part III Operation 2.12 Setting up the outrigger, for detail.
3. Measure the clearance between bottom of the track roller in the middle and shoulder of the rubber track.
  - ★ If the clearance is 5 ~10mm, the tension falls with the standard.
4. If the tension is out of such standard, make adjustment in accordance with Tension Adjustment in the next page.



### [Tension Adjustment]

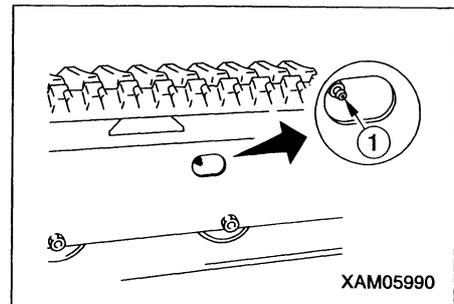
If, as the result of rubber track tension check, the tension is weaker than standard, make adjustment in the following manner:

Working with the track slackened (bend of rubber track being 15mm or greater), will cause the track to go off the rollers or pre-matured wear of core metal to develop.

#### ● In case tension is weak (to increase tension)

★ Have a grease gun (pump) ready.

1. Pack the grease through grease valve ① by means of grease gun.
2. To confirm that the tension is proper, proceed with following:
  - (1) With the outrigger stowed away, ground the machine.
    - ★ For the outrigger stowing method, see 2.23 Stowing the outrigger.
  - (2) Let the machine travel back and forth.
  - (3) Set up the outrigger and lift the machine again by about 50mm off the ground.
    - ★ For the outrigger setting up method, see Part III Operation, 2.12 Setting up the outrigger.
3. Again, conduct the rubber track tension check. If it is not proper yet, repeat the procedure again.
4. Stow away the outrigger and lower the machine to ground.
  - ★ For the outrigger stowing method, see 2.23 Stowing the outrigger.



- In case the tension is strong (to reduce tension)

**⚠ WARNING**

- Grease is packed inside the rubber track tension adjust system, and the grease is at high pressure due to tension of the track. By making adjustment without observing following instruction, grease valve may spring out, to cause serious accident.
- Tension adjustment grease valve should not be turned out by more than one turn. It may cause grease valve to spring out.
- To make tension adjustment, do not position yourself in front of the grease valve to avoid possible risk.

1. Loosen grease valve ① bit by bit to let the grease come out.
2. Use care not to loosen the grease valve ① by more than one turn.
3. If the grease does not come out smoothly, take following measures:

(1) Stow away the outrigger and lower the machine to ground.

★ For the outrigger stowing method, see 2.23 Stowing the outrigger.

(2) Move the machine back and force.

(3) Set up outrigger and lift the undercarriage off the ground by about 50mm.

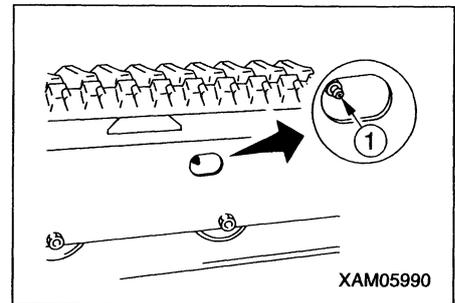
★ For the outrigger setting up method, see 2.12 Setting up the outrigger.

4. Turn-in the grease valve ①.

5. Conduct the rubber track tension check. If the tension is still improper, repeat the adjustment again.

6. Stow away the outrigger and lower the machine to ground.

★ For the outrigger stowing method, see 2.23 Stowing the outrigger.



**[7] Checking rubber track for damage and wear**

**OUR ADVICE**

For making judgment whether to replace, repair or continue to use the existing track, contact your dealer.

Your track needs to be repaired or replaced when it falls in the following condition. Contact you dealer for action.

**[Lug height]**

- When the lug height “a” is reduced by wear, traction force drops. If the lug height “a” is reduced to less than 5mm, replace it with new track.
- With lug having worn, if steel cord inside the rubber track is exposed over two or more links, the track should be replaced.

**[Breakage of steel cord]**

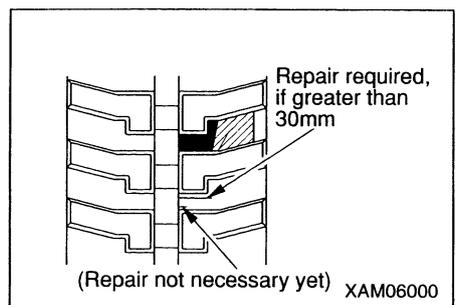
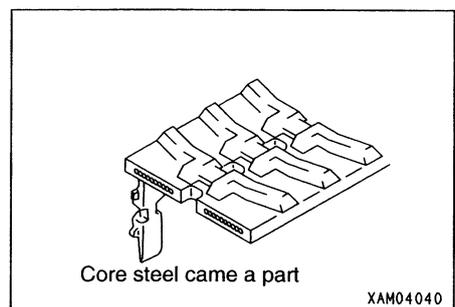
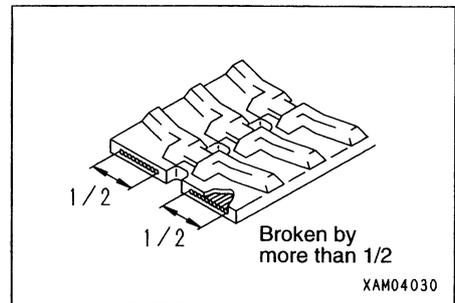
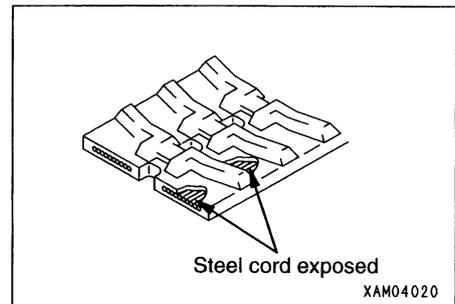
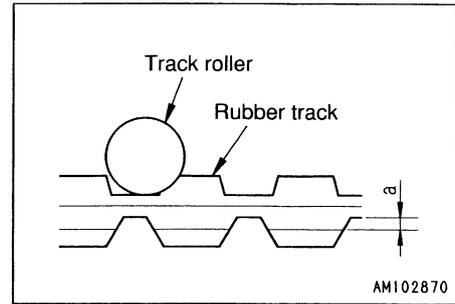
- Any rubber track with more than one half of its steel cord layer on one side is broken, should be replaced with new one.

**[Dropping out of core metal]**

- Any rubber track with its core metal having dropped out at one or more locations should be replaced with new one.

**[Crack]**

- Any crack which develops between rubber track lugs should be repaired when it has grown to about 30mm in length. However, even if the crack appears to be small and short, in case it exposes internal steel cord, it should be repaired immediately.



[8] Replacing the rubber track

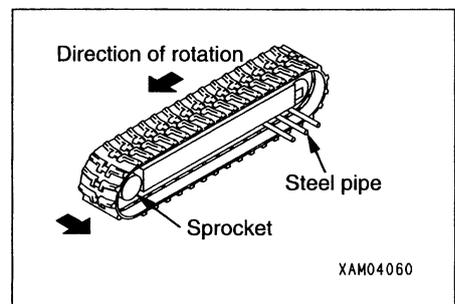
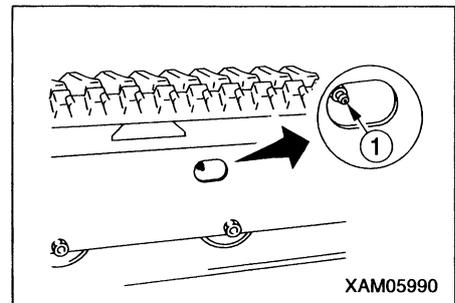
**⚠ WARNING**

- Grease is packed inside the rubber track tension adjust system, and such grease is at high pressure due to tension of the track. By making adjustment without observing following instruction, grease valve may spring out, to cause serious accident.
- Tension adjustment grease valve should not be turned out by more than one turn. It may cause grease valve to spring out.
- To make tension adjustment, do not position yourself in front of the grease valve to avoid possible risk.
- Before disengaging rubber track, make sure that internal grease has been completely removed, then rotate the sprocket.

[Replacing the rubber track]

★ Have a piece of steel pipe ready.

1. Set up outrigger and lift the undercarriage by about 50mm.
  - ★ For the outrigger setting up method, see Part III Operation 2.12 Setting up the outrigger.
2. Loosen the grease valve ① gradually to let grease come out.
3. The grease valve ① should never be turned out by any more than one turn at the maximum.
4. Insert the steel pipe between idler and rubber track as shown in sketch and rotate the sprocket in the direction of rear travel.
5. When the rubber track is lifted with the steel pipe, slide it laterally to remove.



## IV INSPECTION AND MAINTENANCE SERVICE

### [Re-installing the rubber track]

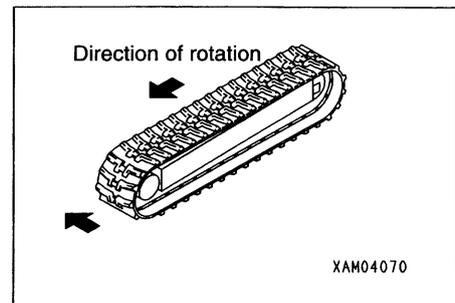
- ★ Have a grease gun ready.
- ★ Have a piece of steel pipe ready.

1. Set up outrigger and lift the undercarriage off the ground by about 50mm.

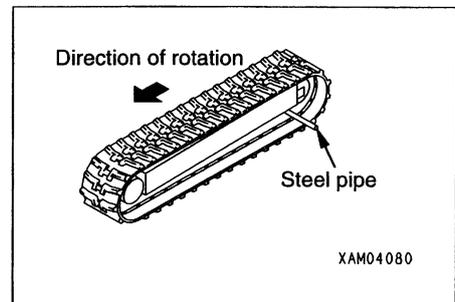
- ★ For the outrigger setting up method, see Part III Operation 2.12 Setting up the outrigger.

2. Mesh the rubber track with sprocket and have it engaged with idler.

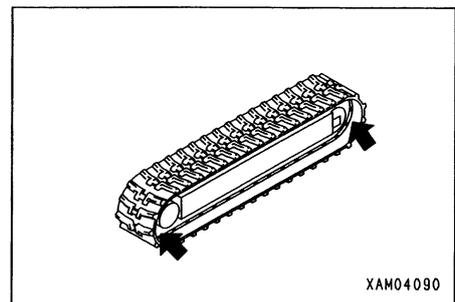
3. With the sprocket rotating in the rear traveling direction, thrust in the rubber track and stop the rotation of sprocket.



4. After inserting the steel pipe, rotate the sprocket again and engage the rubber track with the idler securely.



5. Stop the rotation and make sure that the rubber track is engaged with sprocket and idler securely.



6. Adjust the rubber track tension..

- ★ See [3] Checking and adjusting the rubber track tension.

7. Make sure that engagement of rubber track with sprocket and idler and track tension are satisfactory.

8. Stow away outrigger and lower the machine to ground.

- ★ For the outrigger stowing method, see 2.23 Stowing the outrigger.

[9] Replacing the winch wire rope

**⚠ WARNING**

For replacing the wire rope, be sure to wear heavy working gloves.

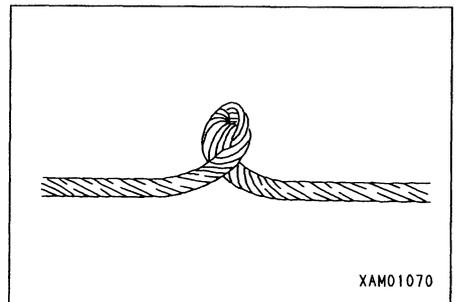
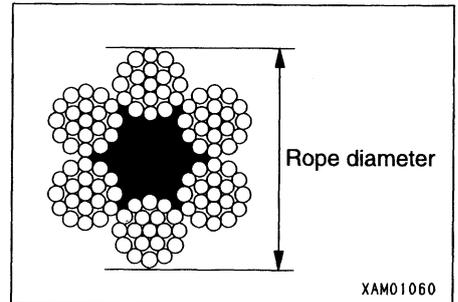
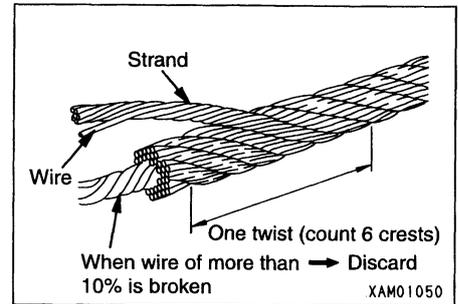
**OUR ADVICE**

- Diameter of wire rope should be measured at its portion that goes over sheave repeatedly and mean value of measurements taken from 3 directions should be adopted.
- Even if it has not been in use, any wire rope that has become aged should not be used.

**[Wire rope fatigues as the time elapses.]**

Wire rope should be replaced when it falls on any of the following conditions.

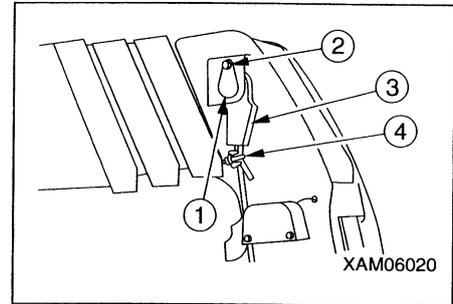
- Those which have been twisted, with kink having developed.
- Those which have been extremely deformed or corroded.
- Those which have deficient end treatment



### [Removing the wire rope]

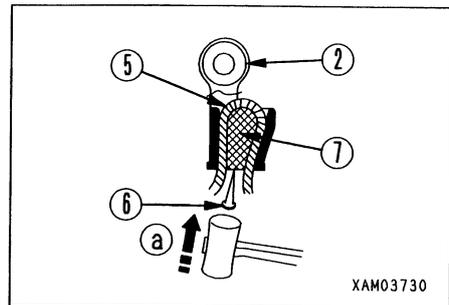
Remove wire rope in the following manner:

1. Lower the outrigger to level, hard ground.
2. Push the boom telescoping lever forward to Extend position and extend the boom slightly.
3. Push the winch lever forward to Down position to ground the hook block.
4. With the wedge socket pin locking bolt ② removed, remove the wedge socket pin ①, before taking off the wedge socket ③.
5. Remove wire clip ④.



6. Remove wire rope ⑤ from wedge socket ③ in the following manner:

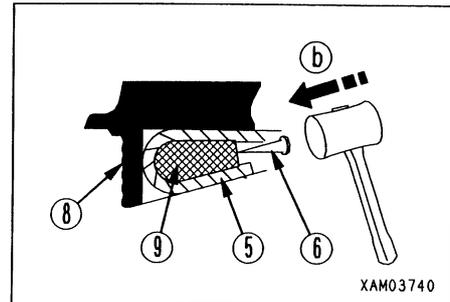
★ Have a piece of round bar ⑥ having diameter of 4-6mm ready and apply it to rope wedge ⑦. Lightly tap it with hammer in the direction of arrow ① to remove the rope wedge ⑦.



7. Push the winch lever forward to Down position and take off the wire rope ⑤ from winch drum.

8. When you have taken off the wire rope, remove the end of wire rope ⑤ which has been attached to winch drum ⑧, in the following manner:

★ Have a piece of round bar ⑥ with diameter of 4-6mm ready and apply it to rope wedge ⑨. Lightly tap it with hammer in the direction of arrow ② to remove the rope wedge ⑨.



9. Take off the remaining wire rope ⑤ completely. That completes the removal of wire rope.

[Installing the wire rope]

**⚠ WARNING**

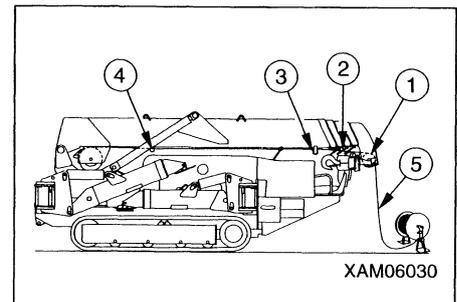
Rope wedge for attaching the wire rope should be installed correctly and firmly. Otherwise, there is a risk of wire rope coming off during crane work, resulting in serious accident.

**OUR ADVICE**

- When taking up wire rope, use care to prevent it from being taken up disorderly on the drum.
- Immediately after installing new wire rope, lift a load (2.9~4.9kN {300~500kg}) with boom extended and hoisted to maximum and repeat hoisting and lowering of hook block a few times for breaking-in the rope.
- Wire rope has been wound in coil. When taking it up, use care not to cause kinks. When taking the rope off the drum, be sure to have the rope itself rotate while unwinding.

Install wire rope in the following manner:

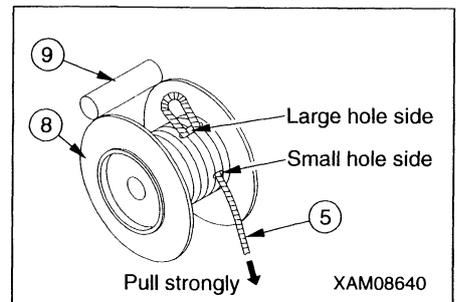
1. Holding the wire rope by its end, thread the wire rope ⑤ through the weight of over-hoist warning, load sheave ① at boom end, No. 2, 3 and 4 wire guides ②, snap sheave ③ and idler ④.



2. Thread the wire rope ⑤ through rope installation hole of winch drum ⑧ and attach it to the winch drum ⑧ in the following manner:

- ★ Thread the wire rope ⑤, as it is slackened, through the winch drum ⑧ and place the rope wedge ⑨ in position ①. Engage the wire rope ⑤ to the wedge ⑨ and pull it hard in the direction of arrow.

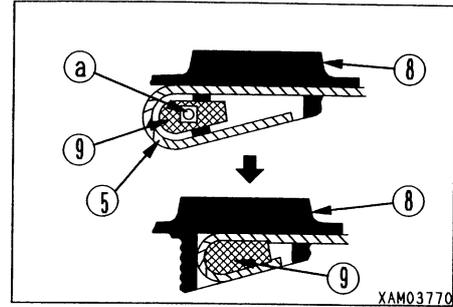
At this time, adjust the wire rope length so that the end of wire rope ⑤ does not protrude from the smaller hole in the winch drum ⑧.



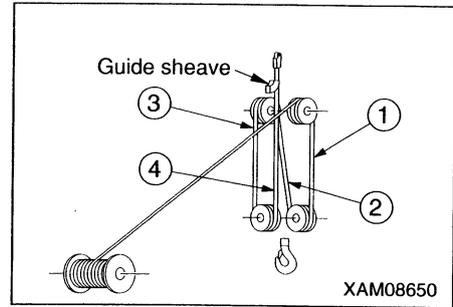
## IV INSPECTION AND MAINTENANCE SERVICE

3. Pull back the winch lever slowly to Up position and take up the wire rope ⑤ onto the winch drum ⑧.

At this time, wire rope should be taken-up between the disorderly take-up preventive roller ⑨ and winch drum, with about 10m of the wire rope remaining beyond the boom end.



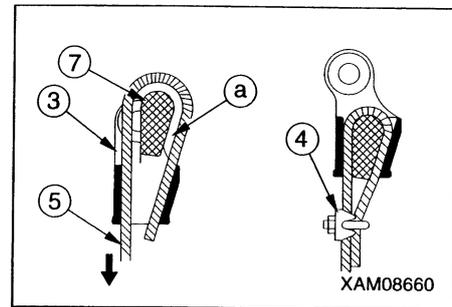
4. According to the number of part reeving (4 part reeving), thread wire rope ⑤ through the boom load sheave, hook block sheave, guide sheave and stowing cam as shown in sketch to the right.



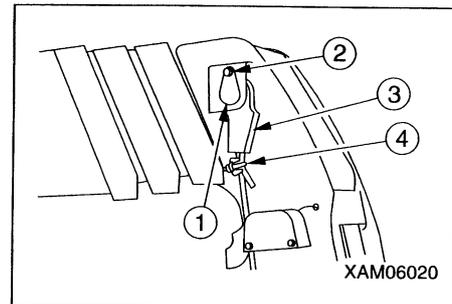
5. In the following manner, attach the end of wire rope ⑤ to the wire socket ③.

★ Thread the wire rope ⑤ to wire socket ③ as shown in the sketch, and place rope wedge ⑦ into position ① before pulling it hard in the direction of arrow.

6. Install wire clip ④ to the wire rope ⑤.



7. Reinstall the wedge socket ③ to boom by means of wedge socket pin ① and lock it with wedge socket pin locking bolt ② in use.



8. By either placing boom hoist lever in Hoist (pull back) or winch lever in Lower (push forward) position, lift off the hook block.

★ Do not operate the winch until the hook block is lifted off.

9. With the boom fully extended and fully hoisted, operate the winch lever to Lower (push forward) position to the extent that wire rope ⑤ on the winch drum ⑧ remains by about 3 or 4 laps.

10. With tension being applied to wire rope ⑤, pull back the winch lever to Up position to take up the wire rope ⑤ on the winch drum ⑧.

[10] Checking and adjusting the boom telescoping wire rope

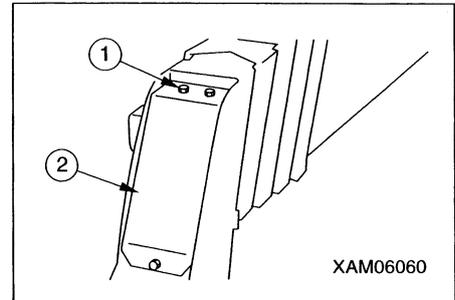
**⚠ WARNING**

For performing the check and adjustment of wire rope, be sure to wear heavy working gloves.

[Checking the wire rope]

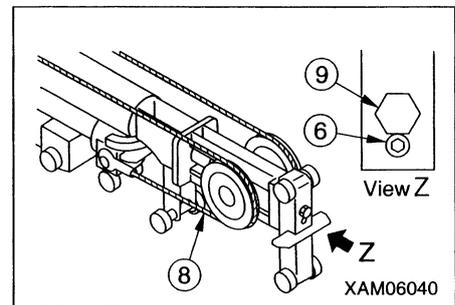
Adjustment is required in case the wire rope for pulling out boom falls on such condition as shown below:

1. Retract boom totally and remove cover mounting bolts ① (x3) at the boom end, before taking off the cover ②.



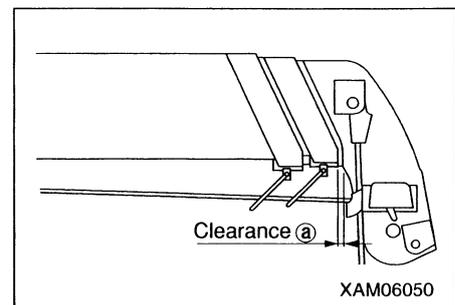
2. After removing the lock bolt ⑥ at the end of T cylinder within the boom, turn the boom pull-out wire rope adjust bolt ⑨ clockwise. If the No.5 boom is extended as this bolt starts to be turned, the tension of boom pull-out wire rope ⑧ is normal.

If the No.5 fails to extend immediately, see Adjusting the Wire Rope to adjust it.



3. Position the boom horizontally and check that the clearance between the booms No.4 and No.5 is 5mm or greater (Clearance -a- in the sketch to the right).

If there exists more than 5mm of clearance, make the adjustment in accordance with paragraph Wire rope adjustment.



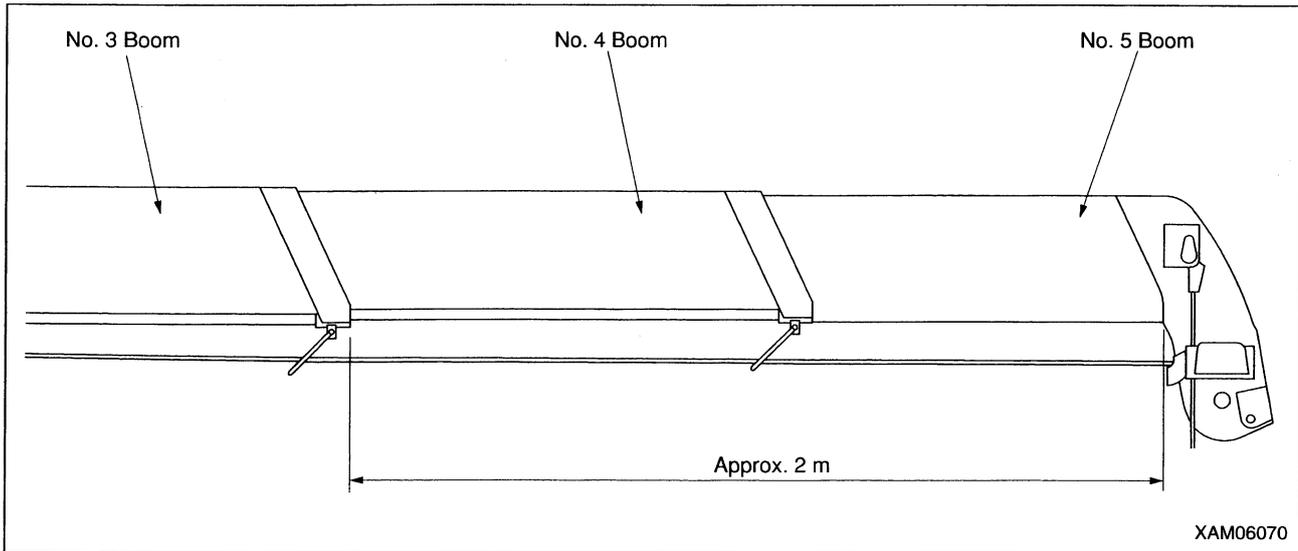
## [Wire rope adjustment]

### OUR ADVICE

When making adjustment of each wire rope, be careful not to give any excessive tension.

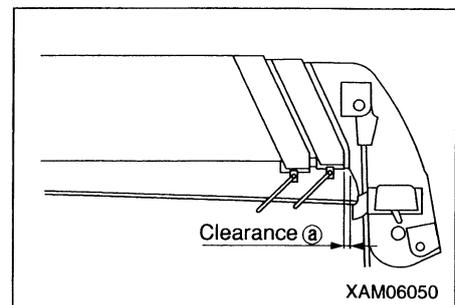
One each of wire rope for boom pulling out and boom retracting are in use.

1. With the boom totally retracted and positioned horizontally, extend boom which makes simultaneous telescoping movement by about 2m.

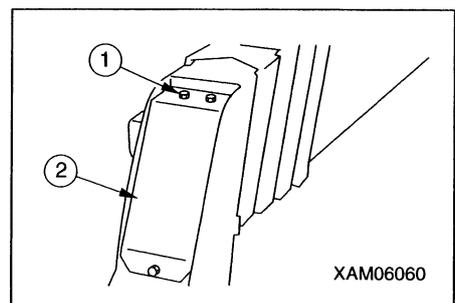


2. Retract boom slowly to stowed position. In this position, measure the clearance (a), and make following judgment:

- If the clearance is 5mm or greater, adjust the No.5 boom retracting wire rope (5).
- If the clearance is zero, make the adjustment in accordance with “Adjusting No.5 boom pulling out wire rope (8)” in step 4 below:

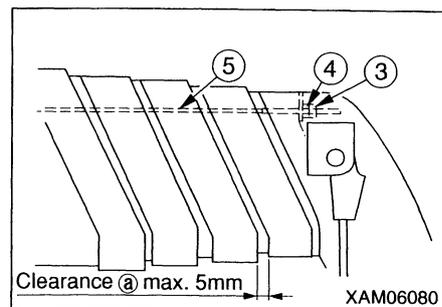


3. With the cover mounting bolts (1) (x3) removed, take off the cover (2).



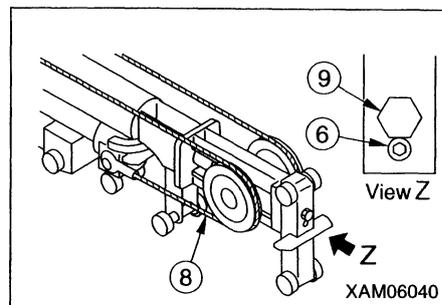
4. Adjusting No.5 boom retracting wire rope ⑤

- (1) With the lock nut ③ loosened, turn-in the adjust nut ④ evenly on each side in the direction of tightening the retracting wire rope ⑤ (Clockwise) until the clearance (a) becomes zero.
- (2) After completing the steps 1 and 2, if the draw-in wire rope is still slackened or the clearance 'a' is greater than 5mm, repeat the adjustment again.



5. Adjusting No.5 boom pulling out wire rope ⑧

- (1) With the lock bolt ⑥ removed, turn-in the adjust bolt ⑨ in the direction in which No.5 boom pulling out wire rope ⑧ is going to be tensioned (clockwise), until immediately before the No.5 boom starts to extend.
- (2) Retighten the No.5 boom retracting wire rope ⑤ adjust nuts ④ by two turns on each of the right and left side.
- (3) Lock the adjust nut ④ for No.5 boom retracting wire rope ⑤ with lock nut ③.
- (4) Retighten the adjust bolt ⑨ for the No.5 Boom pull-out wire rope ⑧ by two turns before locking it with the lock bolt ⑥.



6. After completion of the adjustment, reinstall cover ② for boom top cover with 3 mounting bolts ①.

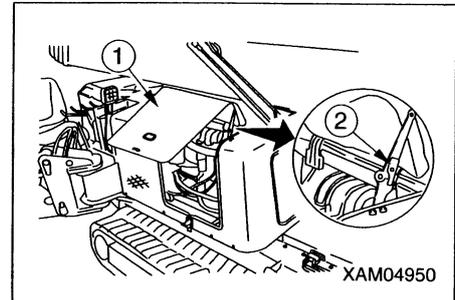
## 8.5 Pre-operation check

Following checks should be conducted before the first engine start up of the day:

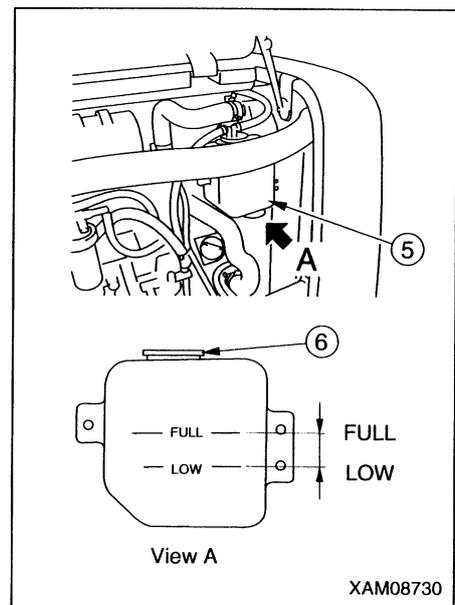
### [1] Checking of the coolant level and replenishment

#### ⚠ WARNING

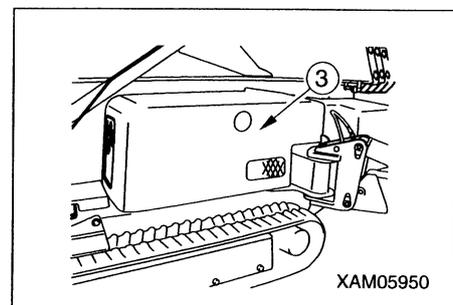
Normally, do not open radiator cap. Coolant check should be carried out with sub-tank ① while the engine is cold.



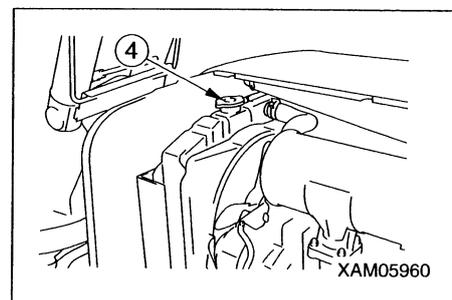
1. Pull back the knob to open engine hood ① and slide the lock ② of stay to lock it securely.
2. Check that coolant level is within the FULL and LOW marks of sub-tank ⑤ and if insufficient, replenish through filler port of the sub-tank ⑤ up to FULL level.
3. After checking or filling, tighten the cap securely.



4. If the sub-tank is found empty, check for its leakage, before checking the water level in radiator. If sufficient, with the cover ③ and radiator cap ④ removed, feed water to radiator, followed by filling the sub-tank.



5. Replace the cover ③ and close the engine hood with the removing procedure reversed.



[2] Checking the engine oil level and replenishing

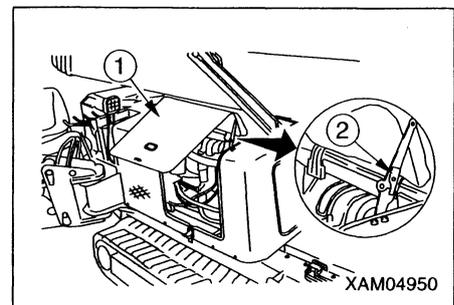
**⚠ CAUTION**

After engine oil level check or replenishment, replace the oil level gauge and filler port cap securely. If the oil level gauge comes off during operation, scalding may result due to gushing hot oil.

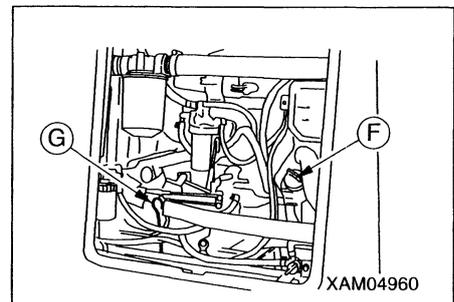
**OUR ADVICE**

- For the oil to use, see Part IV Inspection and Service 5.1 Use of lubricant according to ambient temperature. Using any lubricant not recommended, could shorten the useful life of engine. Be sure to always replenish with specified oil.
- Maintain proper level of engine oil. Excessive oil may cause oil consumption or temperature to increase, resulting in its pre-mature deterioration. Excessively low level of oil may cause engine seizure.

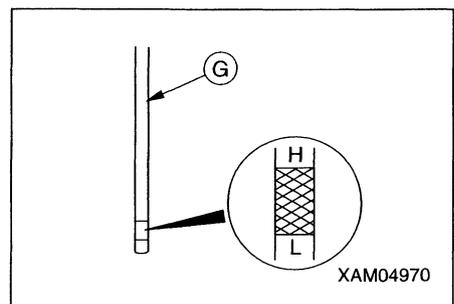
1. Park the machine on level ground.
2. Pull back the knob to open engine hood ① and slide the lock ② of stay to lock it securely.



3. Pull out the oil level gauge ③ and wipe off oil with waste cloth.
4. Insert the gauge ③ into filler port and take it out.
5. Oil level is proper if it is within the range between the marks (H and L) on the gauge rod.
6. If the level does not reach L mark, replenish with engine oil through the filler port ④.



- ★ Replenish with engine oil to midway between markings of H and L on the gauge rod.
7. After replenishing with oil, replace the oil level gauge ③ and filler port cap ④ securely.



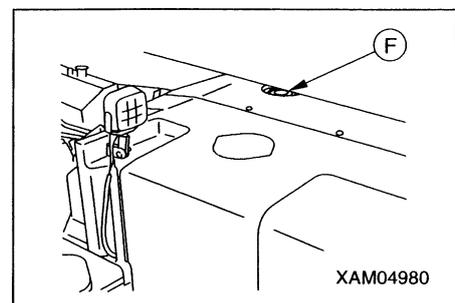
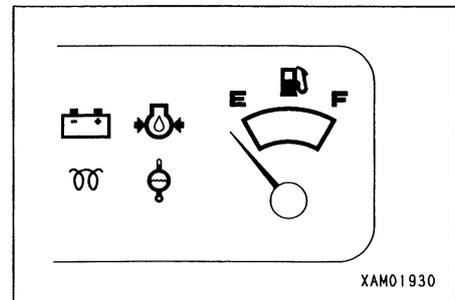
8. Close engine hood ① with the reversed procedure.

### [3] Fuel level check and replenishment

#### **⚠ DANGER**

- For the fuel to use, see Part IV Inspection and Service 5.1 Use of lubricant according to ambient temperature.
- Be careful about fire including lit cigarette.
- When refueling, be sure to shutdown engine. Refueling with the engine running may cause spilled fuel to catch fire at heated muffler or the like.
- Excessive fueling is dangerous as it may cause spilling. Fill the tank to slightly below the maximum specified level. Any spilled fuel should be wiped off clean.
- After refilling, close the tank cap securely.

1. With the starter switch turned to ON position, check the fuel gauge on the meter panel to make sure that the tank is full (close to F).
2. If fuel level is low, remove tank cap **(F)** off the tank top and feed fuel through filler port while watching the fuel meter.
3. After refueling, turn the tank cap **(F)** to close it securely.
  - ★ After day's work, have the tank filled completely.

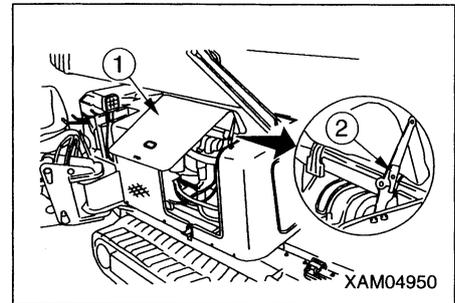


[4] Checking and cleaning the water separator

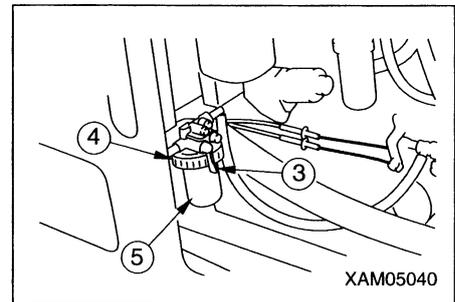
**OUR ADVICE**

Residual water or trash in the water separator pot will be a cause for engine deficiency. Check the pot internals and clean it if water or trash remains in it.

1. Pull back the knob to open engine hood ① and slide the lock ② of stay to lock it securely.

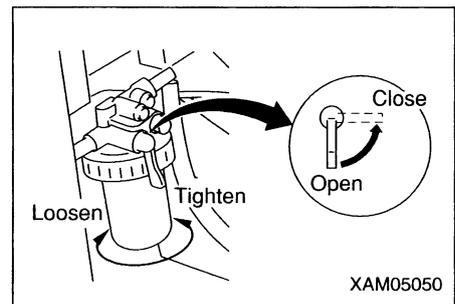


2. Check the water separator pot ⑤ to see if any water or trash remains in it.



3. If it does, clean the pot internals in the following manner:

- (1) Turn the fuel lever ③ to level position (Close) to stop fuel flow.
- (2) Turn the retainer ring ④ counterclockwise and take out the water separator pot ⑤.
- (3) Cleanse the water separator pot ⑤ with light oil, before blowing compressed air (0.02~0.29Mpa) to its internals and remove surface dust.
- (4) After installing the water separator pot ⑤, turn the fuel lever ③ to vertical position (Open).



4. Close the engine hood ① with reversed procedure.

[5] Checking and cleaning the fuel filter pot

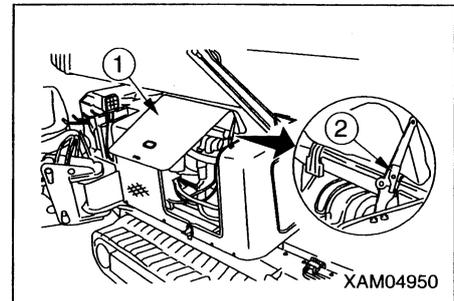
**⚠ WARNING**

- Filter pot contains fuel (light oil). When you clean the filter pot, be careful about fire such as lit cigarette.
- If fuel is spilled while removing the filter pot, be sure to wipe it off clean.

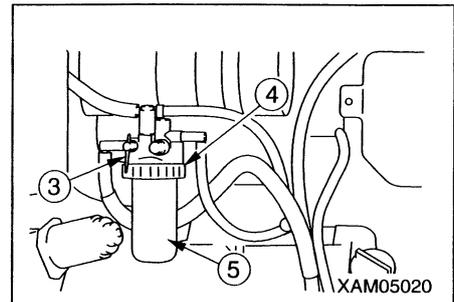
**OUR ADVICE**

If water or trash remains in the filter pot, it can be a cause for engine deficiency. Check the filter pot internals and clean it if any water or trash should remain.

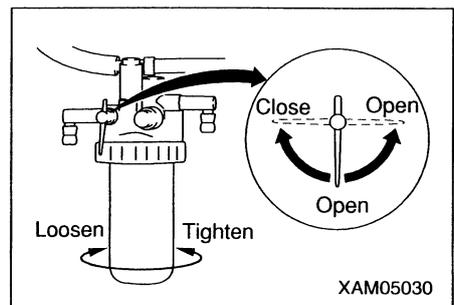
1. With engine hood ① opened, slide the lock ② of stay and lock it securely.



2. Check the filter pot ⑤ to see if water or trash does not remain in it or if element is not clogged with trash.
3. If water or trash should remain in the filter pot, clean its internals in the following manner:



- (1) Turn the fuel lever ③ to horizontal position (Close) to stop fuel flow.
- (2) Turn retainer ring ④ counterclockwise and take out filter pot ⑤ and element.
- (3) Cleanse the filter pot ⑤ and element with light oil, before blowing compressed air (0.02~0.29Mpa) {2~3kgf/m<sup>2</sup>} to the internals and re-move surface dust.
- (4) After reinstalling the filter pot ⑤ and element, turn the fuel lever ③ to vertical position (Open).



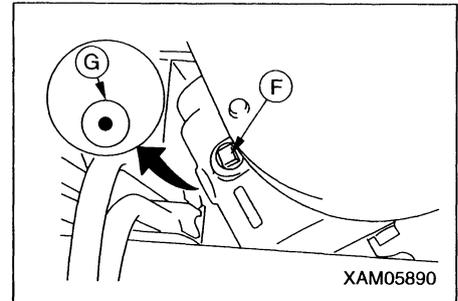
4. Close the engine hood ① with the reversed procedure.

**[6] Inspection of oil level in swing reducer case and replenishment**

**OUR ADVICE**

- As for the oil to be used, see Part IV Inspection and Service, 5.1 Use of Lubricant according to Ambient Temperature.
- After inspecting and replenishing with the oil, apply seal tape to thread portion of the level check and filler plugs for prevention of leakage before tightening them securely.

1. Check the oil level sight gauge (G) of swing reducer case to make sure that oil is up to the center point of the gauge.
2. If insufficient, feed gear oil through the filler port (F)  
★ Fill it up to the center point of the gauge (G).
3. After feeding oil, tighten the filler plug (F) securely with seal tape or the like in use.

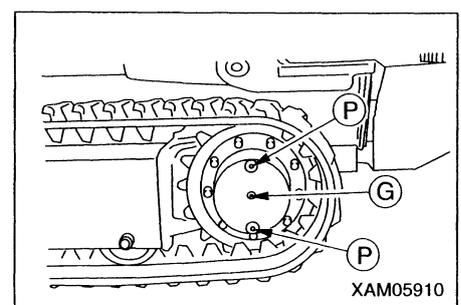


**[7] Inspection of oil level in the final drive case and replenishment**

**OUR ADVICE**

- As for the oil to be used, see Part IV Inspection and Service, 5.1 Use of Lubricant according to Ambient Temperature.
- After inspecting and replenishing with the oil, apply seal tape to thread portion of the level check and filler plugs for prevention of leakage before tightening them securely.

1. Move the machine back and forth so that one of the two final drive case drain plugs (P) comes to right at the bottom.
2. With the oil check plug (G) removed, make sure that oil comes out of the plug hole.
3. If insufficient, remove the plug (P) (upper one) and feed gear oil through its hole.  
★ Feed oil until oil starts to come out of the hole of level check plug (G).
4. After feeding oil, tighten the level check plug (G) and the other plug (P) (upper) securely.



[8] Checking the hydraulic oil tank level and replenishment

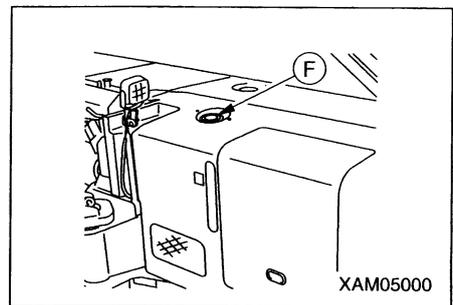
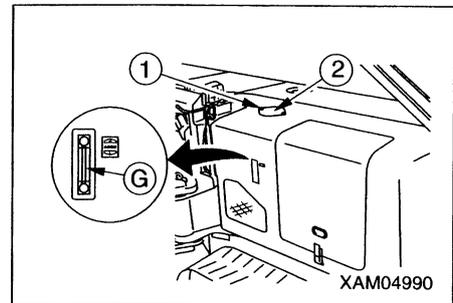
**⚠ WARNING**

- Removing the hydraulic oil tank cap can cause oil to gush. Turn the cap slowly to have internal pressure escape before removing it.
- After replenishing with oil, be sure to close the cap securely. Otherwise, tank cap may come off during operation, causing hot oil to gush and you to incur scalding.

**OUR ADVICE**

- ★ See Part IV Inspection and Service 5.1 Use of lubricant according to ambient temperature, for the type of oil to use.
- For conducting oil level check, be sure to let the machine assume Travel Position. Checking the oil level with the machine in Operating Position leads to excessive replenishment because oil in each cylinder has not returned to tank.
- Do not refill oil up to Level Point on level gauge ⑥.

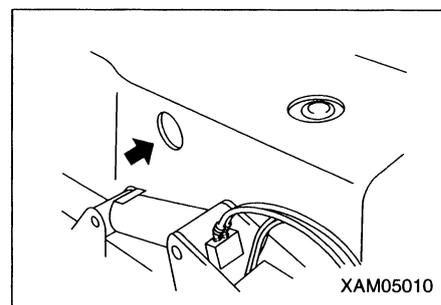
1. Check the level gauge ⑥ on the right side of engine cover to see that the level is in between H and L marks.
2. If insufficient, with mounting bolt ① (x2) removed, take the cover ② off. Remove tank cap ⑤ at the tank top, while watching the level gauge ⑥ and replenish with oil through filler port.
3. After replenishing, close the tank cap ⑤ securely. Reinstall the cover ② with the reversed procedure.



**[9] Checking and cleaning the engine exhaust hole****⚠ WARNING**

If trash, straw dust or dead leaves are deposited around engine exhaust hole, they can be a cause for fire. Be sure to check the exhaust hole and clean.

Check the engine exhaust hole to see if trash, straw dust or dead leaves are not deposited there. If yes, remove them.

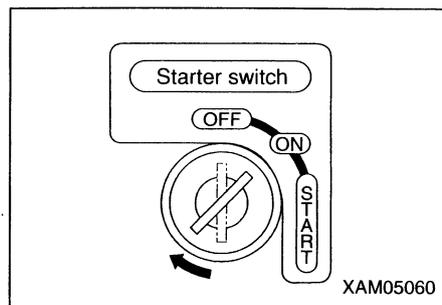
**[10] Checking the electric wiring****⚠ WARNING**

- If fuse blows frequently or there is a trace of electric wiring having short circuited, be sure to check for the cause and correct.
- Accumulation of inflammable stuff such as dead leaves, dead twig or dry grass can be a cause for fire. Be sure to remove them.
- Keep the top surface of battery clean and check breather hole in the battery cap. If it is clogged with dirt, wash it with water to eliminate clogging.

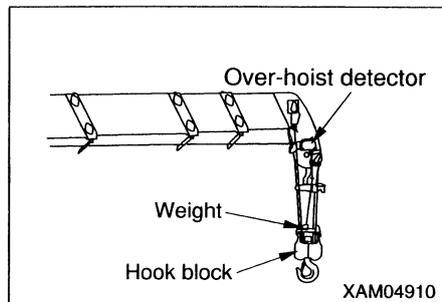
Check to see if fuse is not damaged, fuse with proper capacity is in use, there is no broken wiring or trace of having short circuited, or terminals are not loosened, and correct any situation which may be found to be deficient. In particular, check the wiring of battery, starter and alternator. Be sure to check and remove if there is no accumulation of inflammable stuff around the battery. For trouble shooting and repair, call your dealer.

### [11] Checking the horn and over-hoist preventive device

1. Insert the key into starter switch and turn it to ON position.

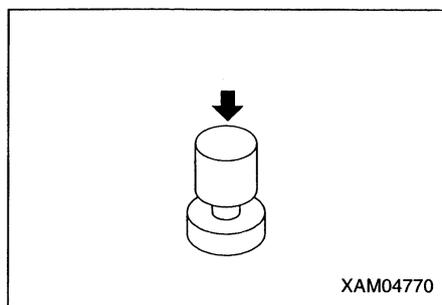


2. With the hook block over-hoisted, perform the action of winch hoisting and boom extension respectively. Make sure that either of such action causes the horn to sound or, unless speaker volume is nullified, message "Hook is being over-hoisted" will sound and hoisting or extending motion has been disabled. If this does not happen, deficiency of over-hoist preventive device is conceivable. Call your dealer for service.



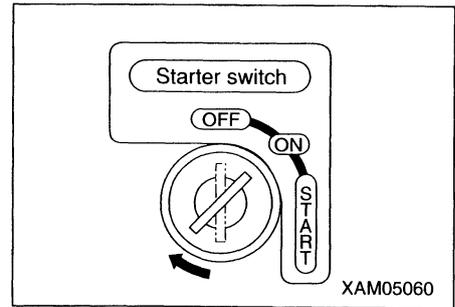
3. Push the horn switch to make sure that it sounds.

If it does not, call your dealer because trouble or broken wiring in connection with the horn is conceivable.



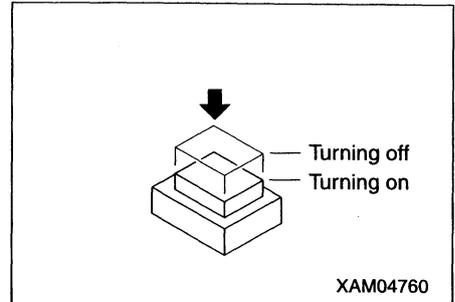
**[12] Checking the flood light**

1. With the key inserted to starter switch, turn it to ON position.



2. Press the front and rear flood lamps to see the flood lamps at the machine front and at operator seat front go on. If it does not, burnt bulb or broken wiring is conceivable. Call your dealer.

★ Flood light itself has a switch as well. Have this switch also placed in ON position.



**[13] Checking the boom and frame for crack, deformation or damage**

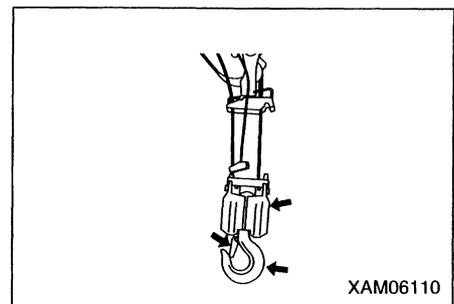
Check the boom and frame for crack, deformation or any other damage, and correct them if anything abnormal is found.

**[14] Checking the wire rope for deformation, damage or wear**

Check the rope end fixing, rope take up condition and contact between the ropes. For the check and inspection of wire rope while winching and boom telescoping, see Part III Operation 4. Handling of wire rope.

**[15] Checking the function of winch and boom**

1. Make sure that the motion of winch hoist and lower, boom hoist and lower, boom telescoping and swinging coincide with position of control lever operation.
2. While conducting the checks of preceding paragraph, check for any abnormal noise from various part of crane including boom and hydraulic motor.
3. Operate crane with no-load, and check for any loosened or missing bolt and nut.
4. Check the hook for deformation, abnormal noise from bearing or if wire rope retainer is properly functioning.



### [16] Adjusting the operator seat

#### **⚠ WARNING**

- Make this adjustment before starting your operation or when operator has changed.
- Adjust it so that you can depress accelerator pedal sufficiently with your back resting on the operator seat back rest.

#### 1. Longitudinal adjustment

With the lever ① moved to the left, adjust the seat to desired position before releasing the lever.

Allowance for longitudinal adjustment ①: 120mm (in 6 positions)

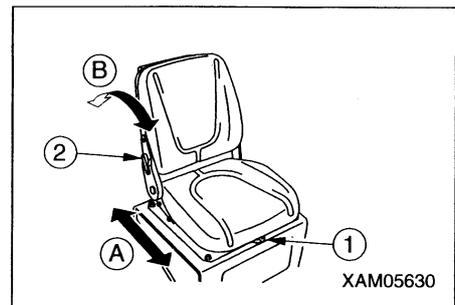
#### 2. Recline adjustment

#### **OUR ADVICE**

Be sure to check the space in your back before changing the back rest angle.

Pull up the lever ② and adjust the back rest to desired angle.

Adjusting allowance ②: 75 degrees (7 positions forward and 23 positions backward)



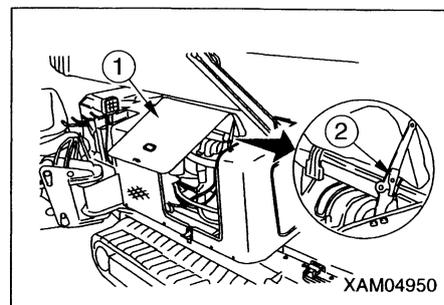
## 8.6 Service in every 50 hours

### [1] Checking and cleaning the water separator

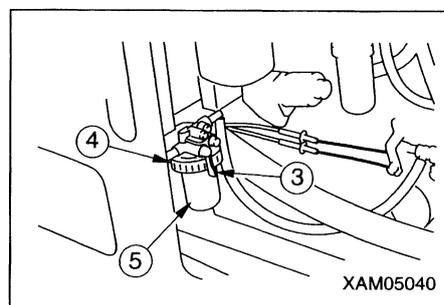
#### OUR ADVICE

If water or trash remains in water separator pot it may be a cause for engine deficiency. Check the pot internals and clean if there remains water or trash.

1. Pull back the knob to open engine hood ① and slide the lock ② of stay to lock it securely.

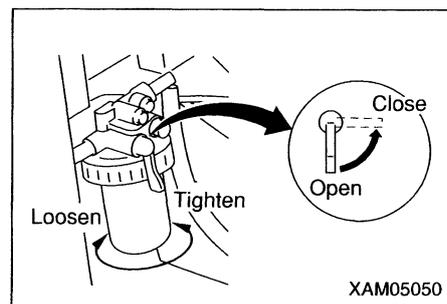


2. Check the water separator pot ⑤ to see that there is no water or trash remaining internally.



3. If any water or trash should remain in the pot, clean the pot internals in the following manner:

- (1) Turn the fuel lever ③ to level position (Close) to stop fuel flow.
- (2) Turn the retainer ring ④ counterclockwise and take out the water separator pot ⑤.
- (3) Clean the water separator pot ⑤ with gasoline before replacing it to original position.
- (4) After installing the water separator pot ⑤, turn the fuel lever ③ to vertical position (Open).



4. Close the engine hood ① with reversed procedure.

## 8.7 Service in every 100 hours

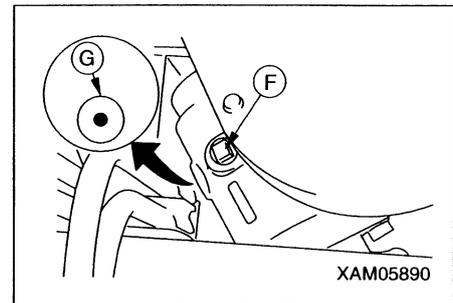
Carry out 50 hour services at the same time.

### [1] Checking the swing machinery case oil level and replenishment

#### **OUR ADVICE**

- For the oil to use, see Part IV Inspection and Service 5.1 Use of oil according to ambient temperature.
- After inspecting and replenishing with oil, apply seal tape to thread portion of filler plug for prevention of leakage before tightening them securely.

1. Check the oil level sight gauge ⑥ of swing reducer case to make sure that it is up to the center point of the gauge.
2. If oil is insufficient, feed gear oil through feed port ⑦.
3. After feeding oil, tighten the feed plug ⑧ securely with seal tape or the like.



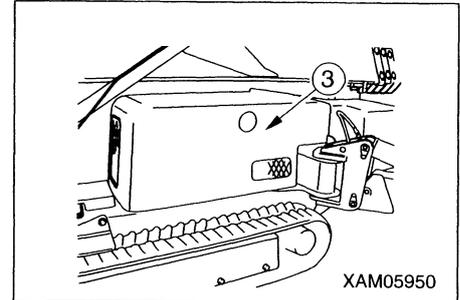
## 8.8 Service in every 250 hours

Carry out 50 and 100 hours services simultaneously.

### [1] Check and adjustment of alternator belt tension

#### [Tension check]

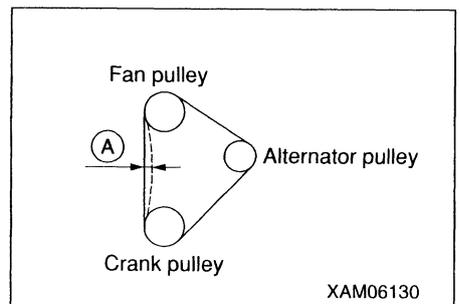
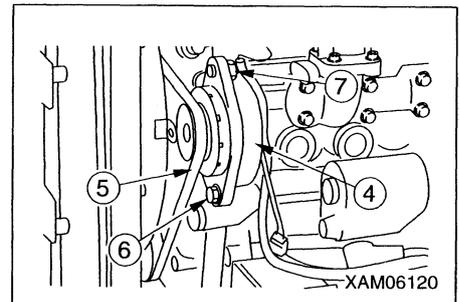
1. With mounting bolts (x9) of left side engine cover ③ removed, take off the engine cover ③.
2. Amount of slack A is normal if it is 10~15mm with the belt depressed at its midway with finger (force of about 98.0N {10kgf}).



#### [Tension adjustment]

● Have a crowbar and wooden piece ready.

1. Place the bar between alternator ④ and cylinder and fix it to the alternator ④.
  - ★ Between the crowbar and alternator, place the wooden piece for protection of the alternator.
2. Loosen lower bolt ⑥ and adjust bolt ⑦.
3. Pull back the crowbar and slide the alternator ④ so that the amount of slack A of the belt ⑤ is about 10~15mm.
4. Tighten the lower bolt ⑥ and adjust bolt ⑦ and lock the alternator ④.
5. Check pulley, V groove and belt for damage and wear. In particular, make sure that the belt is not in contact with the bottom of V groove.
6. If the belt has elongated to the extent that the adjusting allowance is lost or it has scar or crack in it, replace with new one.
  - ★ For replacement of the belt, call your dealer.
7. When the belt is replaced, make adjustment again after one hour of operation.
8. After completion of the adjustment, reinstall the engine hood ③ with the reversed procedure.

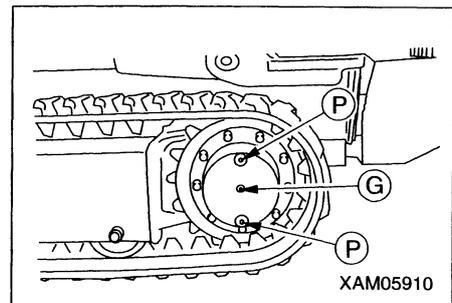


### [2] Checking the final drive case oil level and replenishment

#### OUR ADVICE

- For the oil to use, see Part IV Inspection and Service, 5.1 Use of oil according to ambient temperature.
- After checking and replenishing, apply seal tape or the like to thread portion of level gauge plug or oil filler port plug for prevention of leakage and tighten them securely.

1. Move the machine back and force so that one of the two drain plugs (P) of final drive case comes right at the bottom.
2. With the oil level check plug (G) removed, check to see if the oil comes out of the plug hole.
3. If oil is insufficient, remove the plug (P) (upper) and feed gear oil through the plug hole.
4. Fill oil until oil flows out of the level check plug hole (G).
5. After feeding oil, tighten both plugs (G) and (F) securely.



**[3] Greasing various part of the machine**

**OUR ADVICE**

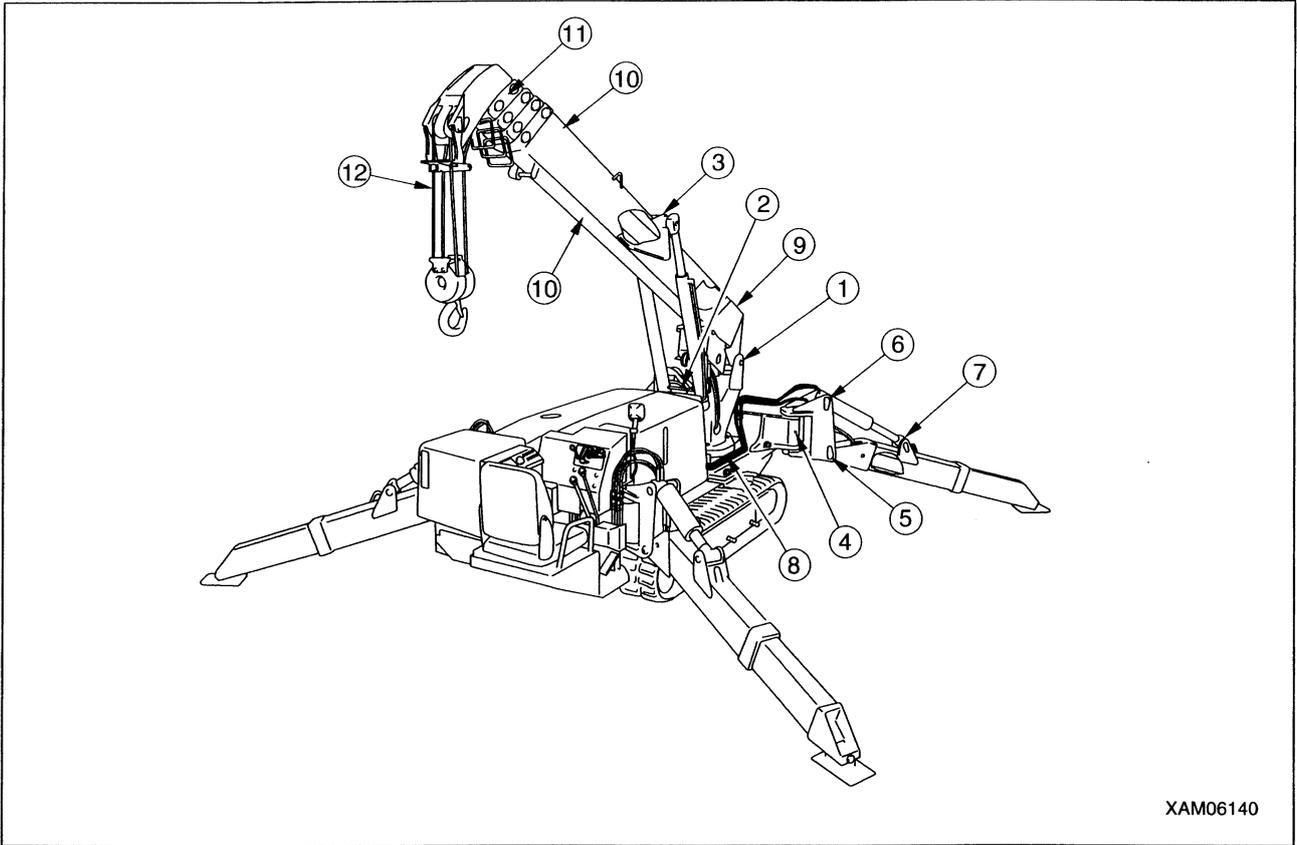
- Type of grease will vary depending on the location to use. Use of improper grease can even shorten the useful life of the machine. See Part IV Inspection and Service 5.2 Recommended type of lubricant.
- During the first 100 hours when the initial break-in takes place, carry out greasing service in every 10 hours.

★ Use suitable type of grease for particular location in accordance with the chart below:

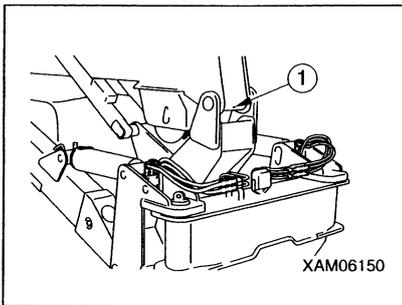
| No. | Location of greasing   |             | Type of grease    |
|-----|--|-------------|-------------------|
| 1.  | Greasing of boom mounting pin                                  | 1 locations | Litium grease     |
| 2.  | Greasing of derrick cylinder bottom end mounting pin           | 1 location  |                   |
| 3.  | Greasing of Derrick cylinder rod end mounting pin              | 1 location  |                   |
| 4.  | Greasing of outrigger rotary shaft                             | 4 locations |                   |
| 5.  | Greasing of outrigger mounting pin                             | 4 locations |                   |
| 6.  | Greasing of outrigger setting cylinder bottom end mounting pin | 4 locations |                   |
| 7.  | Greasing of out rigger setting cylinder rod side mounting pin  | 4 locations |                   |
| 8.  | Greasing of swing gear   | 2 locations |                   |
| 9.  | Greasing of boom slide plate                                   | 8 locations | Molybdenum grease |
| 10. | Grease coating of boom surface at each side and bottom         | Each boom   |                   |
| 11. | Grease coating of boom extending wire rope                     | 2 ropes     | Rope oil          |
| 12. | Grease coating of winching wire rope                           | 1 rope      |                   |

1. Using a grease gun, pack the grease through grease fitting as shown with arrow. (See next page.)
2. After greasing, any old grease which has been pushed out should be wiped off clean.
3. For greasing each outrigger cylinder, set up the outriggers.
4. For greasing the derrick cylinder mounting pin and slide plate on top of boom, pull back the boom hoist lever to Hoist position and hoist the boom slightly.
5. For greasing each side and bottom of boom and wire rope, push the boom telescoping lever forward to extend the boom.
6. For prevention of wear and corrosion of wire rope, coat the rope with red rope grease. When coating, remove any smear from rope surface and use brush for coating application.

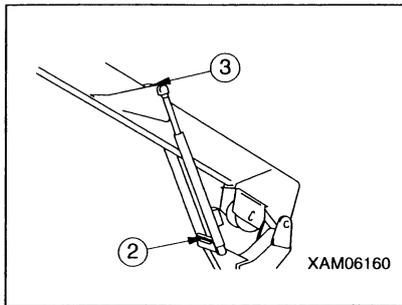
**IV INSPECTION AND MAINTENANCE SERVICE**



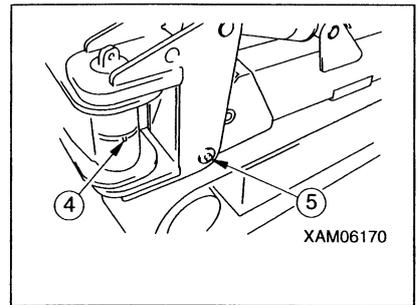
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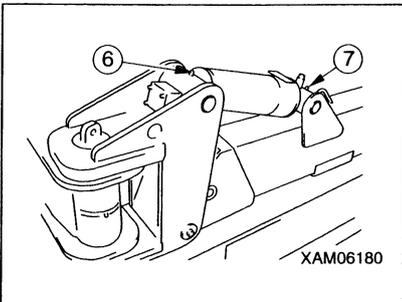
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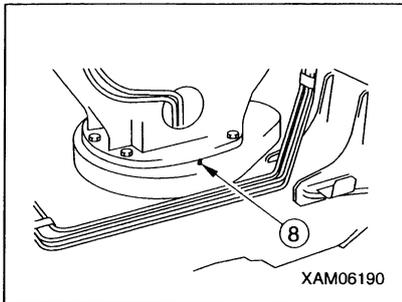
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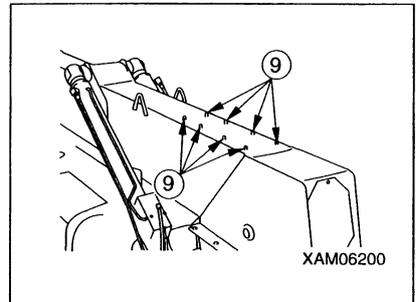
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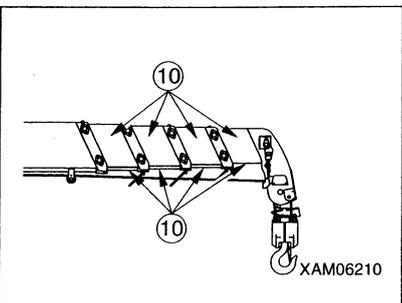
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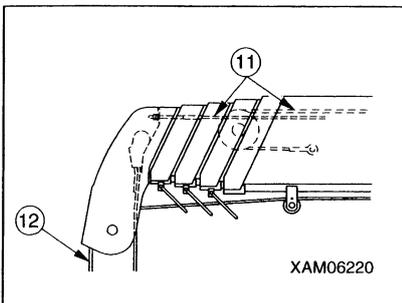
XAM06190



XAM06200



XAM06210



XAM06220

## 8.9 Service in every 500 hours

Carry out 50, 100 and 250 hours services in parallel.

### [1] Replacing oil in engine oil pan and filter cartridge

#### **⚠ CAUTION**

- After checking or replenishing the oil, tighten oil level gauge securely. It can come off during operation, causing hot oil to gush and you to incur scalding.
- Immediately after engine has been in operation, its various parts remain hot. Do not proceed with oil replacement immediately but wait for the engine to cool to the extent that you can touch it with your hand. On the other hand, if the engine gets completely cold, oil can not be drained totally.
- Make sure that old packing is not stuck to filter base. If it is, it can be a cause for oil leakage.

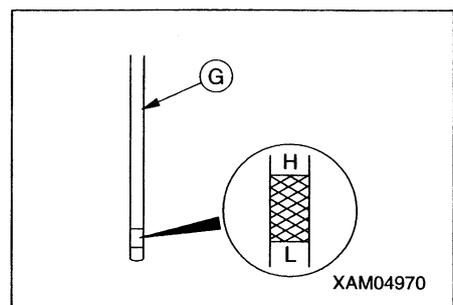
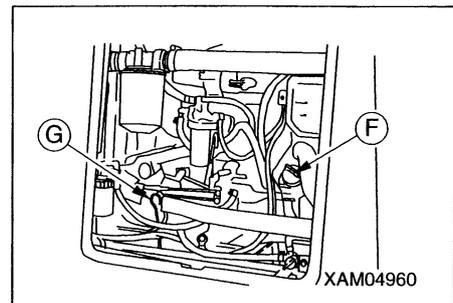
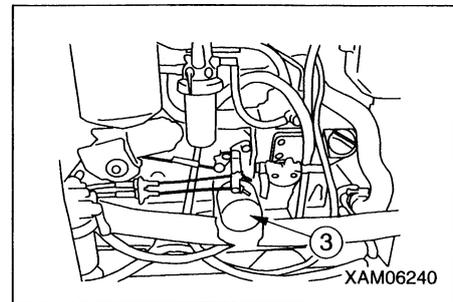
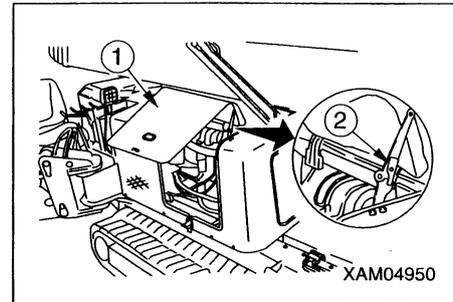
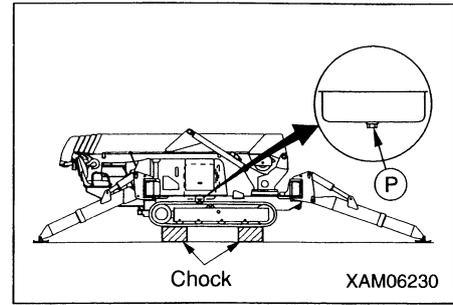
#### **OUR ADVICE**

- For the type of oil to use, see Part IV Inspection and Service 5.1 Use of lubricant according to ambient temperature. Using any oil of not recommended type can shorten the useful life of your engine. Be sure to replenish with specified type of oil.
- Maintain the engine oil level properly.

- ★ Have a container to receive drained oil ready: 3 liter or greater capacity
- ★ Volume of oil actually to be replaced at oil pan: 2.4 liters

## IV INSPECTION AND MAINTENANCE SERVICE

1. Park the machine on level ground.
2. Referring to Part III Operation, 2-12, extend outrigger to maximum and, with the grounding cylinders extended, lift the machine to secure a space to allow you to slide into underneath it. For safety assurance, place robust blocks below the tracks.
3. Place a container to receive oil directly underneath the drain plug (P) of the oil pan.
4. Turn the drain plug (P) slowly to avoid spashing oil, before removing it for draining the oil.
5. Check the drained oil and if it has contained great deal of metal particle or foreign matter, contact your dealer.
6. Reinstall the drain plug (P).
7. Retract outrigger cylinders to lower the machine to ground and pull back the knob to open the engine hood (1), before sliding the stay lock (2) for locking it securely.
8. By means of filter wrench, turn filter cartridge (3) counterclockwise to remove it. Wait for about 10 minutes to do so because, plenty of oil will come out if it is done immediately after stopping the engine.
9. Clean the filter base and reinstall new filter cartridge (3) after coating its packing and thread portion with clean engine oil (or lightly with grease).
10. When reinstalling the filter cartridge, rotate it by more than one half turn to tighten, after the face of packing has come into contact with seal surface of the filter base.
11. After replacing the filter cartridge, feed engine oil through filler port (F) to the specified level.
12. Pull out oil level gauge rod (G) and wipe off oil with waste cloth.
13. Insert the rod and pull it out again.
14. Make sure that the level is between the markings (H and L) on the gauge rod (G).
15. After replenishing with oil, tighten the gauge rod (G) and filler port (F) securely.
16. Run the engine at idling speed for a while and stop engine to check that oil level is between the H and L marks on the gauge rod (G).
17. Close the engine hood (1) with the reversed procedure.

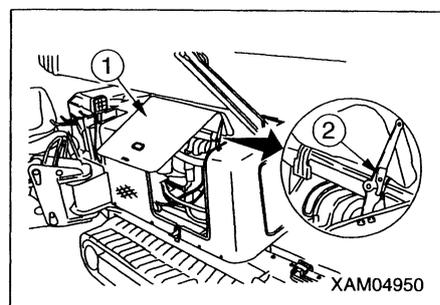


## [2] Replacing the hydraulic oil return filter cartridge

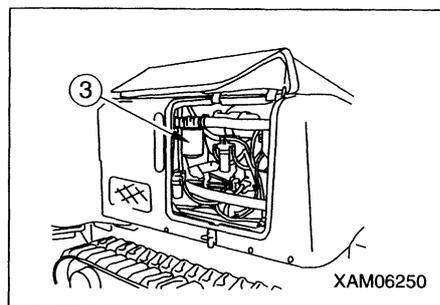
**⚠ WARNING**

Remove the filler port cap after having internal pressure escape by turning it slowly first.

1. Park the machine on level ground.
2. Let the machine assume Travel Position.
  - ★ See Part III Operation 1.5 Traveling position of the machine.
3. Pull back the knob to open the engine hood ① and slide the lock ② of stay to lock it securely.



4. Using filter wrench, remove filter cartridge ③.
5. Clean the filter base and install new filter cartridge after coating its packing and thread portion with clean engine oil (or lightly with grease).
6. When installing the filter cartridge, rotate it by more than one half turn to tighten, after the face of packing has come into contact with seal surface of the filter base.
7. Check for any oil leakage and wipe it off if any.
8. After replacing the filter cartridge, check the oil level and if it is insufficient, refer to Part III Operation 2.1 Check before starting up the engine, for inspection and replenishment.
9. Close the engine hood ① with the reversed procedure.

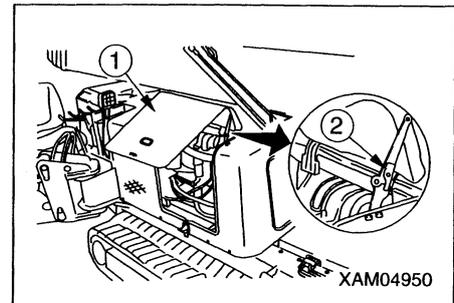


[3] Replacement of fuel filter element

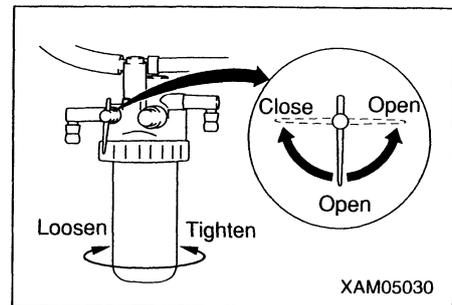
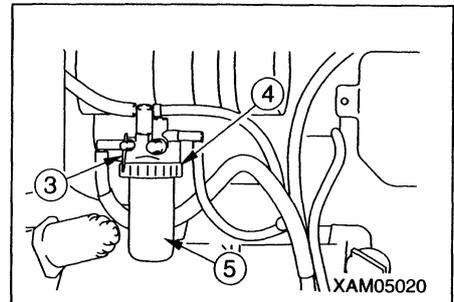
**⚠ WARNING**

- Immediately after engine has been in operation, do not proceed with filter replacement because each part of engine remains hot. Wait until it cools down.
- Do not allow any fire to approach.

1. Pull back the knob to open the engine hood ① and slide the lock ② of stay to lock it securely.
2. Turn the cock ③ to the direction of "Close".
3. Turn the retainer ring ④ counterclockwise to loosen and remove filter pot ⑤.



4. After cleaning the cup with light oil, blow compressed air (0.20~0.29Mpa: 2~3kg/cm<sup>2</sup>) to its internals to remove trash off the surface.
5. Install new filter element and reinstall the filter pot with its removing procedure reversed.
6. After reinstalling the filter pot, carry out de-aeration of fuel system.



7. Close the engine hood ① with the reversed procedure.

## 8.10 Service in every 1000 hours

Carry out 50, 100, 250 and 500 hours service simultaneously.

### [1] Replacing the oil in hydraulic oil tank

#### **⚠ WARNING**

- Immediately after the engine has been in operation, various parts of engine remains hot. Do not proceed with oil replacement immediately but wait until the oil cools down completely.
- Removing the hydraulic oil tank cap can cause oil to gush. Remove the cap only after having internal pressure escape by turning it slowly.
- After oil replacement, close the tank cap securely. The cap can fall off during operation, causing hot oil to gush and you to incur scalding as the result.

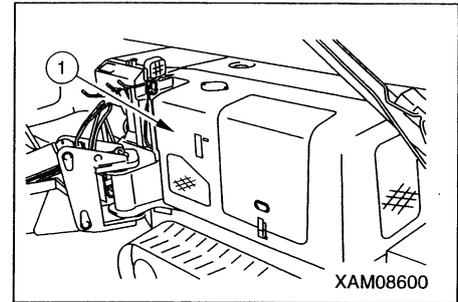
#### **OUR ADVICE**

- For the oil to use, see Part IV Inspection and Service 5.1 Use of lubricant according to ambient temperature.
- For conducting oil level check, be sure to let the machine assume Travel Position. Checking oil level with the machine in Operating Position may cause you to judge the level to be too low and feed oil excessively.
- After replacing hydraulic oil, do not start the engine for a while until piping and hydraulic system are filled with oil.
- Do not feed oil to exceed Level Point on level gauge ⑥.

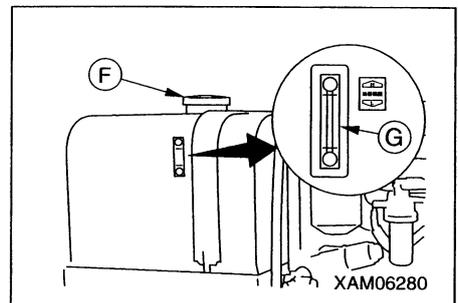
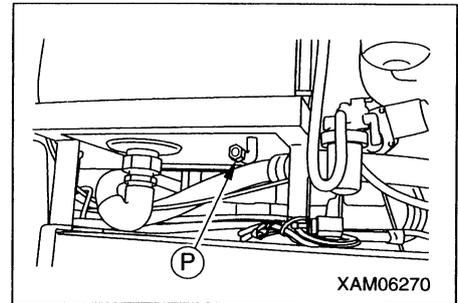
- ★ Container for receiving drained oil: Have a container with capacity of 50 liters or greater ready.
- ★ Volume of oil to actually replace in the tank: 44 liters

## IV INSPECTION AND MAINTENANCE SERVICE

1. Park the machine on level ground.
2. Let the machine assume Travel Position.
  - ★ For the Travel Position, see Part III Operation 2.5 Travel Position of the machine.
3. With mounting bolt (x15) for right hand side engine cover ① removed, take off the engine cover ①.



4. Remove tank cap (F) at the top of hydraulic oil tank.
5. Place the container for receiving drained oil directly below the drain cap (P).
6. Turn the drain cap (P) slowly to avoid splashing oil on yourself, and drain oil.
7. Check the drained oil and if plenty of metal particle or other foreign matter is contained, contact your dealer.
8. Reinstall the drain cap (P).
9. After completion of hydraulic oil replacement, replace the engine cover ① with the removing procedure reversed.
10. With the tank cap (F) removed at the top of hydraulic tank, replenish with hydraulic oil while watching the oil level gauge (G).



11. After replacement of hydraulic oil, de-aerate the hydraulic system in the following manner:

- (1) After waiting for all the piping and hydraulic systems to be filled with oil, start up engine. After the engine has started, continue to run it at idling speed at least for 10 minutes.
- (2) With the engine running at low speed, operate each of the crane control lever to operate each cylinder and winch motor slowly. As far as the boom hoist cylinder and boom telescoping cylinder are concerned, do not actuate them all the way to the stroke end but let them stop at about 100mm before. Conduct this for 4 to 5 repetitions.
- (3) Extend outriggers and actuate them to the extent that they do not lift the machine. Do not telescope the outrigger cylinders to the stroke end but let them stop at about 100mm before. Repeat this for 4 or 5 times.

12. Retract all the cylinders and check oil level with its gauge (G).  
If it is not up to mark H on the rod, replenish with the hydraulic oil to the H mark.

13. After replenishment, tighten the tank cap (F) securely.

[2] Replacing the oil in swing machinery case

**⚠ WARNING**

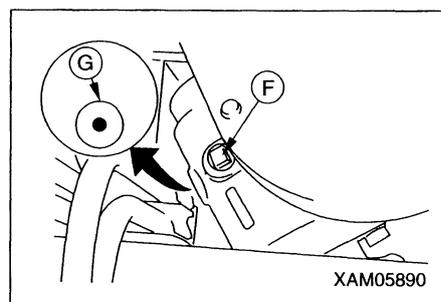
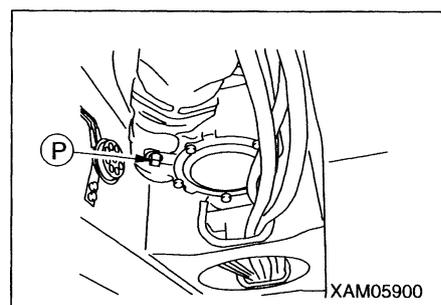
Drain plug of the swing machinery case is located directly at the bottom of the machine. For draining the oil, set up the outrigger and lift the machine to the maximum so you can enter underneath.

**OUR ADVICE**

- For the oil to use, see Part IV Inspection and Service 5.1 Use of lubricant according to ambient temperature.
- When replacing the oil, apply seal tape or the like to thread portion of drain plug and filler port plug for prevention of leakage before tightening them securely.

- ★ Container for receiving the drain oil: Have a container with 1 liter or greater capacity ready.
- ★ Actual volume of swing machinery case replacement oil: 0.6 liter

1. Park the machine on level ground.
2. Set up outrigger and lift the machine to the maximum.
  - ★ For the outrigger setting up procedure, see Part III Operation, 2.12 Outrigger setting up operation.
3. Place the container to receive the drain directly underneath the drain plug (P) of the swing machinery case.
4. Remove the swing machinery filler plug (F).
5. Turn the drain plug (P) slowly to avoid splashing oil on yourself and drain the oil.
6. Check the drained oil to see if it contains plenty of metal particle or other foreign matter. If yes, contact your dealer.
7. Reinstall the drain plug (P).
8. Feed gear oil through feed plug hole (F). Check the oil level check sight gauge (G) to make sure that the level is up to center of the sight gauge.
9. After replenishment, tighten the filler plug (F) securely with seal tape or the like.



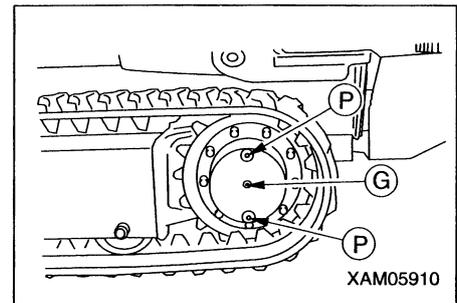
### [3] Replacing oil in final drive case

#### OUR ADVICE

- For the oil to use, see Part IV Inspection and Service 5.1 Use of lubricant according to ambient temperature.
- When replacing the oil, apply seal tape or the like to thread portion of drain plug and filler port plug for prevention of leakage before tightening them securely.

- ★ Container for receiving the drain oil: Have a container with 1 liter or greater capacity ready.
- ★ Actual volume of final drive case replacement oil: 0.7 liter

1. Park the machine on level ground.
2. Move the machine back and forth so that one of the drain plugs (P) comes right at the bottom.
3. Place a container directly under the drain plug (P) (lower) to receive drain oil.
4. Remove the final drive case drain plug (P).
5. Turn the drain plug (P) slowly to avoid splashing oil and drain the oil.
6. Check the drained oil to see if it contains plenty of metal particle or other foreign matter. If yes, contact your dealer.
7. Reinstall the drain plug (P).
8. With the plug (P) (upper) removed, feed gear oil through the plug hole.
  - ★ Feed oil until oil comes out of the level check plug (G) hole.
9. After replenishment, tighten the oil level check plug (G) and upper plug (P) securely.



## **8.11 Service in every 2000 hours**

Carry out 50, 100, 250, 500 and 1000 hour services simultaneously.

### **[1] Checking the alternator and starter**

1. There are possibilities of brush having worn or bearing grease having dried up. Contact your dealer for inspection and service.
2. In case where frequency of starting up engine is high, make your request for inspection in every 1000 hours.



**Part V**  
**Data and Specifications**

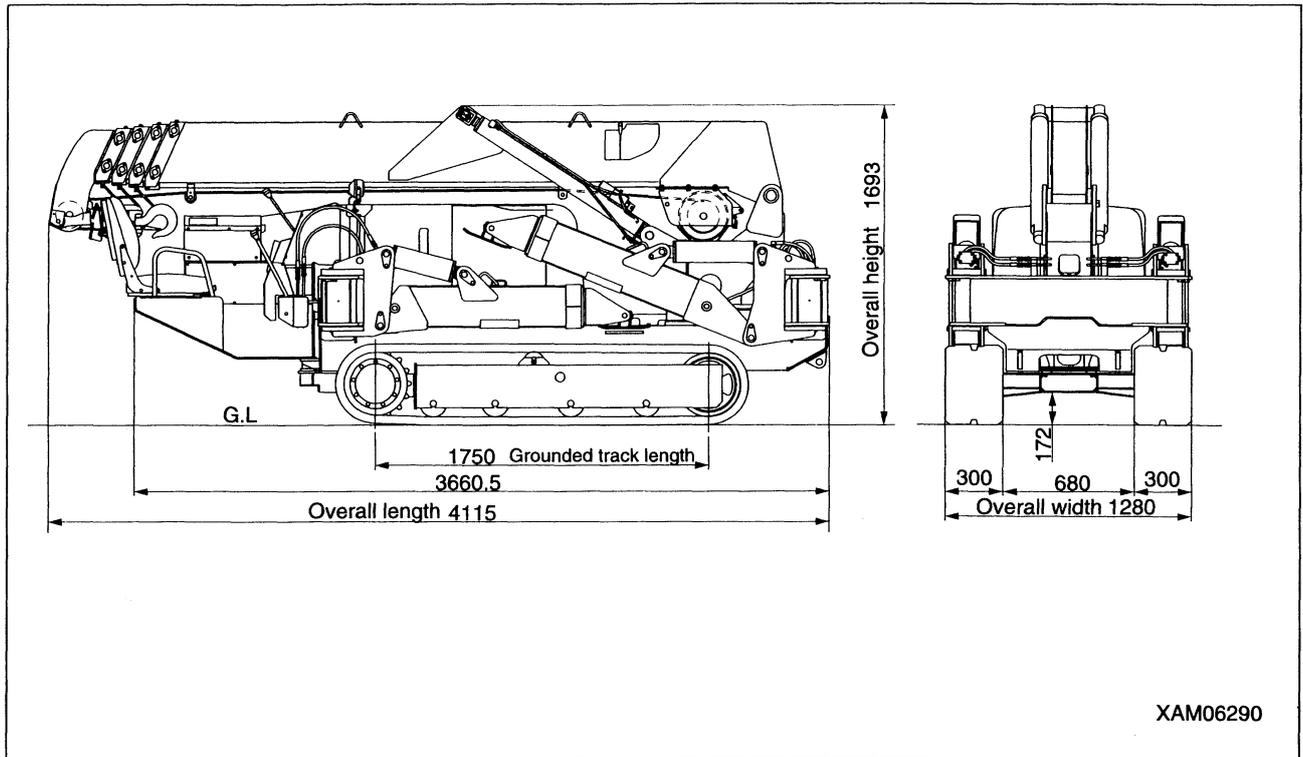
1. Main Data and Specifications.....226

# 1. Main Data and Specifications

## 1.1 Main data and specifications

| Systems and Items   |   | Model MC-305C   |
|---------------------|---|---|
| Mass and dimensions | Mass of the machine<br>Overall length x overall width x overall height<br>Distance between sprocket and drive shaft centers<br>Track gauge<br>Track width<br>Minimum ground clearance | 3700kg<br>4115mm × 1280mm × 1693mm<br>1750mm<br>980mm<br>300mm<br>147.5mm   |
| Performance         | Maximum rated total load x working radius<br>Maximum working radius<br>Maximum lifting height over ground level   | 2.93t x 2.50m<br>12.16m<br>12.66m   |
| Winch system        | Type<br>Hook hoist speed<br>Hoist wire rope   | Swash plate axial piston motor,<br>differential gear reducer, friction disk brake<br>15m/min<br>φ 8 × 73m (4 part reeving)  |
| Telescoping system  | Type<br>Type of boom<br>Boom length<br>Boom telescoping speed   | Sequential hydraulic cylinders × 3<br>+ Wire rope telescoping system × 1<br>5 stage boom with pentagonal section<br>3.675m ~ 12.485m<br>8.79m / 25.5sec   |
| Boom hoist system   | Type<br>Hoist angle and time  | Hydraulic cylinder direct acting system x 2<br>0 ~ 80° / 14.3 sec   |
| Swing system        | Type<br>Swing angle and speed   | Ball bearing support, hydraulic motor driven,<br>worm and spur gear reducer<br>360 degrees continuous / 26.5 rpm  |
| Outrigger system    | Type<br>Maximum extended width  | Extension: Hydraulic cylinder direct acting<br>Setting up Hydraulic cylinder direct acting<br>(Front) 4504mm × (Lateral) 4887mm × (Rear) 4394 mm  |
| Travel system       | Type<br>Travel speed<br>Grade ability<br>Ground pressure (with shoe width:300mm)  | Hydraulic motor driven, stepless speed changer,<br>built-in brake<br>Forward and reverse 0 ~ 3 km/h<br>23.5°<br>35.3 kPa { 0.36 kgf/cm <sup>2</sup> }   |
| Hydraulic system    | Rated pressure<br>Hydraulic pump<br>Hydraulic oil tank capacity   | 2 throw, variable capacity, piston pump<br>13 cc / rev + 13 cc / rev / 44.1 ℓ<br>Travel : 20.6 MPa { 210kgf / cm <sup>2</sup> }<br>Crane work : 19.1 MPa { 195kgf / cm <sup>2</sup> } 44 ℓ (Complete with oil cooler)                 |
| Engine              | Model<br>Type<br>Displacement<br>Rated output (Continuous)<br>Type of fuel and tank capacity  | Yanmar 3TNE74 —MB1<br>Water cooled, 4 cycle straight in-line, 3cylinder,<br>direct injection diesel<br>1006 cc { 1.006 ℓ }<br>13.9 kw / 2530min <sup>-1</sup> { 19 PS / 2530 rpm }<br>Light oil / 37 ℓ                                |
| Battery             | Type  | 55B24R  |
| Safety systems      | —   | Over-hoist preventive device, load indicator,<br>hydraulic safety valve, load meter, hydraulic<br>automatic lock system, wire rope retainer,<br>warning buzzer, leveling instrument and over-<br>loading preventive device (optional) |

### 1.2 Outer dimensions



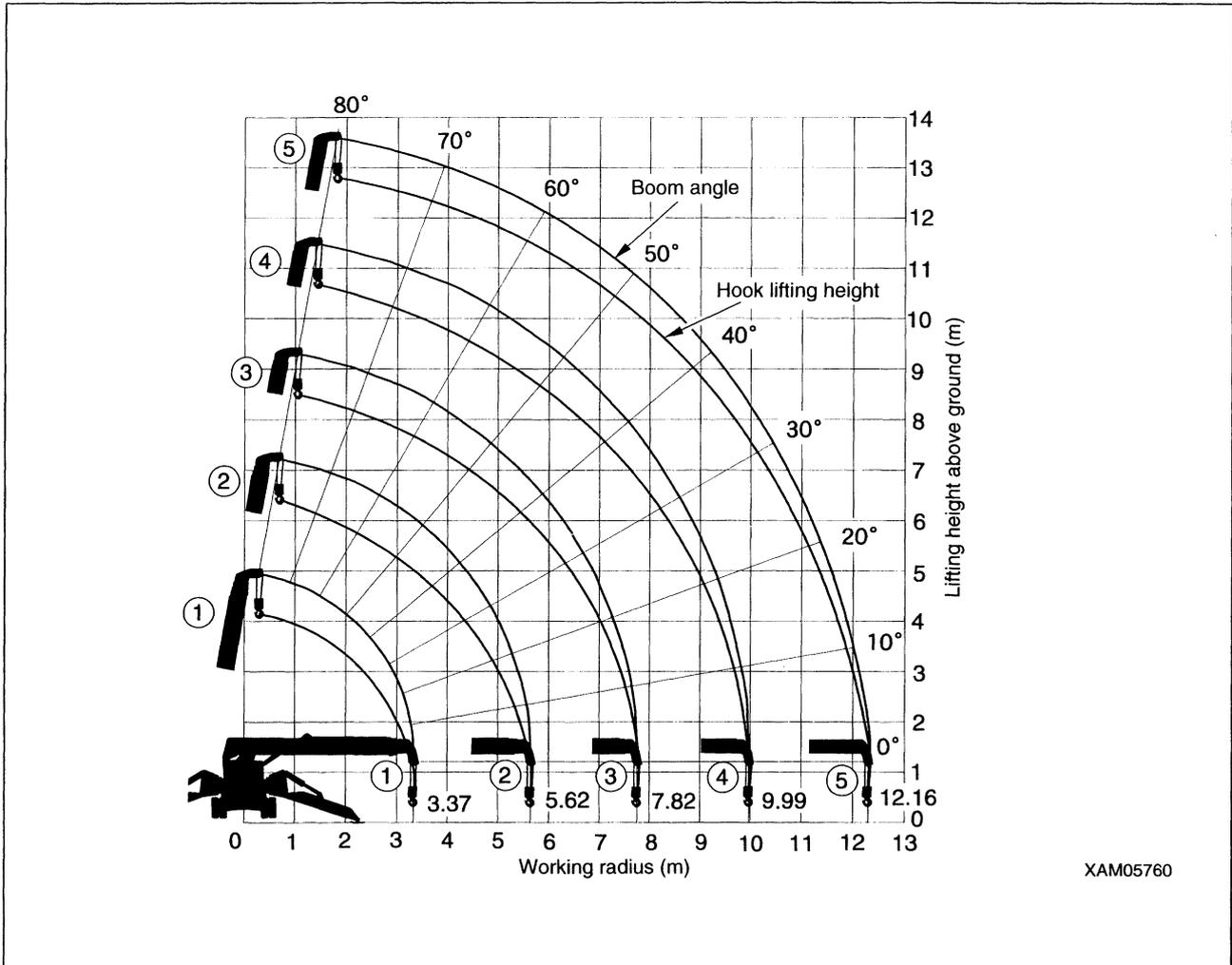
1.3 Rated total load chart

| MC-305C Rated Total Load Chart     |   |      |                                   |      |      |                                    |      |                    |                                    |                |      |      |      |      |      |                    |                |       |      |                |      |      |      |                    |                |      |      |       |      |                |      |                    |      |      |      |      |      |       |      |                |     |     |      |     |     |      |      |       |     |     |     |     |
|------------------------------------|---|------|-----------------------------------|------|------|------------------------------------|------|--------------------|------------------------------------|----------------|------|------|------|------|------|--------------------|----------------|-------|------|----------------|------|------|------|--------------------|----------------|------|------|-------|------|----------------|------|--------------------|------|------|------|------|------|-------|------|----------------|-----|-----|------|-----|-----|------|------|-------|-----|-----|-----|-----|
| With Outrigger Extended to Maximum |   |      | With Outrigger Extended to Midway |      |      | With Outrigger Extended to Minimum |      |                    | With Outrigger Extended to Minimum |                |      |      |      |      |      |                    |                |       |      |                |      |      |      |                    |                |      |      |       |      |                |      |                    |      |      |      |      |      |       |      |                |     |     |      |     |     |      |      |       |     |     |     |     |
| Boom ① and Boom ①+②                | 2.5 or shorter  | 3.0  | 3.5                               | 4.0  | 4.5  | 5.0                                | 5.62 | Working Radius (m) | 2.5 or shorter                     | 3.0            | 3.5  | 4.0  | 4.5  | 5.0  | 5.62 | Working Radius (m) | 2.5 or shorter | 3.0   | 3.5  | 4.0            | 4.5  | 5.0  | 5.62 | Working Radius (m) | 2.5 or shorter | 3.0  | 3.5  | 4.0   | 4.5  | 5.0            | 5.62 | Working Radius (m) |      |      |      |      |      |       |      |                |     |     |      |     |     |      |      |       |     |     |     |     |
| Rated total load (kg)              | 2930  | 2350 | 1950                              | 1670 | 1450 | 1300                               | 1120 |                    | 2930                               | 2350           | 1950 | 1670 | 1380 | 1140 | 950  |                    | 2930           | 2350  | 1950 | 1680           | 1430 | 1140 | 950  | 790                |                | 2270 | 2090 | 1680  | 1370 | 1120           | 910  | 790                | 670  | 510  | 430  |      |      |       |      |                |     |     |      |     |     |      |      |       |     |     |     |     |
| Boom ①+②+③                         | When boom③ is extended to any extent, work should be carried out based on the performance of Boom ①+②+③.                      |      |                                   |      |      |                                    |      |                    |                                    |                |      |      |      |      |      |                    |                |       |      |                |      |      |      |                    |                |      |      |       |      |                |      |                    |      |      |      |      |      |       |      |                |     |     |      |     |     |      |      |       |     |     |     |     |
| Working Radius (m)                 | 2.7   | 3.0  | 3.5                               | 4.0  | 4.5  | 5.0                                | 5.62 |                    | 2.7                                | 3.0            | 3.5  | 4.0  | 4.5  | 5.0  | 5.62 |                    | 2.7            | 3.0   | 3.5  | 4.0            | 4.5  | 5.0  | 5.62 |                    | 2.7            | 3.0  | 3.5  | 4.0   | 4.5  | 5.0            | 5.62 |                    | 2.7  | 3.0  | 3.5  | 4.0  | 4.5  | 5.0   | 5.62 |                |     |     |      |     |     |      |      |       |     |     |     |     |
| Rated total load (kg)              | 2270  | 2090 | 1680                              | 1415 | 1230 | 1070                               | 945  | 790                | 2270                               | 2090           | 1680 | 1415 | 1230 | 1070 | 945  | 790                | 610            | 520   |      | 2270           | 2090 | 1680 | 1370 | 1120               | 910            | 790  | 670  | 510   | 430  |                | 2270 | 2090               | 1680 | 1370 | 1120 | 910  | 790  | 670   | 510  | 430            |     |     |      |     |     |      |      |       |     |     |     |     |
| Boom ①+②+③+④                       | When boom④ is extended to any extent, work should be carried out based on the performance of Boom ①+②+③+④.                    |      |                                   |      |      |                                    |      |                    |                                    |                |      |      |      |      |      |                    |                |       |      |                |      |      |      |                    |                |      |      |       |      |                |      |                    |      |      |      |      |      |       |      |                |     |     |      |     |     |      |      |       |     |     |     |     |
| Working Radius (m)                 | 4.0   | 4.5  | 5.0                               | 6.0  | 7.0  | 8.0                                | 9.0  | 9.99               | 4.0                                | 4.5            | 5.0  | 6.0  | 7.0  | 8.0  | 9.0  | 9.99               |                | 4.0   | 4.5  | 5.0            | 6.0  | 7.0  | 8.0  | 9.0                | 9.99           |      | 4.0  | 4.5   | 5.0  | 6.0            | 7.0  | 8.0                | 9.0  | 9.99 |      | 4.0  | 4.5  | 5.0   | 6.0  | 7.0            | 8.0 | 9.0 | 9.99 |     |     |      |      |       |     |     |     |     |
| Rated total load (kg)              | 1060  | 950  | 860                               | 750  | 645  | 540                                | 490  | 415                | 1060                               | 950            | 860  | 750  | 630  | 490  | 410  | 350                |                | 1060  | 950  | 860            | 750  | 630  | 490  | 410                | 350            |      | 1060 | 950   | 860  | 750            | 680  | 530                | 420  | 340  | 300  |      | 1060 | 950   | 860  | 750            | 680 | 530 | 420  | 340 | 300 |      |      |       |     |     |     |     |
| Boom ①+②+③+④+⑤                     | When more than one-half of mark is exposed from boom④, work should be carried out based on the performance of Boom ①+②+③+④+⑤. |      |                                   |      |      |                                    |      |                    |                                    |                |      |      |      |      |      |                    |                |       |      |                |      |      |      |                    |                |      |      |       |      |                |      |                    |      |      |      |      |      |       |      |                |     |     |      |     |     |      |      |       |     |     |     |     |
| Working Radius (m)                 | 4.5 or shorter  | 5.0  | 6.0                               | 7.0  | 8.0  | 9.0                                | 10.0 | 11.0               | 12.16                              | 4.5 or shorter | 5.0  | 6.0  | 7.0  | 8.0  | 9.0  | 10.0               | 11.0           | 12.16 |      | 4.5 or shorter | 5.0  | 6.0  | 7.0  | 8.0                | 9.0            | 10.0 | 11.0 | 12.16 |      | 4.5 or shorter | 5.0  | 6.0                | 7.0  | 8.0  | 9.0  | 10.0 | 11.0 | 12.16 |      | 4.5 or shorter | 5.0 | 6.0 | 7.0  | 8.0 | 9.0 | 10.0 | 11.0 | 12.16 |     |     |     |     |
| Rated total load (kg)              | 775   | 640  | 495                               | 410  | 360  | 290                                | 260  | 250                | 775                                | 640            | 495  | 410  | 360  | 290  | 260  | 250                |                | 775   | 640  | 495            | 410  | 360  | 290  | 260                | 250            |      | 775  | 640   | 495  | 410            | 360  | 290                | 260  | 250  |      | 775  | 640  | 495   | 410  | 360            | 290 | 260 | 250  |     | 775 | 640  | 495  | 410   | 360 | 290 | 260 | 250 |

Notes  
 1. The Rated Total Load Chart indicates the value for work on level, hard ground. Sufficient attention should be paid for because, depending on the ground conditions where outrigger is placed, the crane can tip over.  
 2. The Rated Total Load Chart is based on actual working radius which includes bend of boom due to lifting load. Rough operation is extremely dangerous even if you are working within the rated total load. Learn to always perform safe operation.  
 3. Depending on extension and placement of outrigger, crane could tip over even by lifting a rated total load. Be always alert.  
 4. Rated total load shown includes the weight of hook block (30kg).

XAM05770

### 1.4 Working radius and lifting height diagram



XAM05760



**Part VI**  
**Optional Parts and Attachments**

1. Checking the Moment Limiter.....232

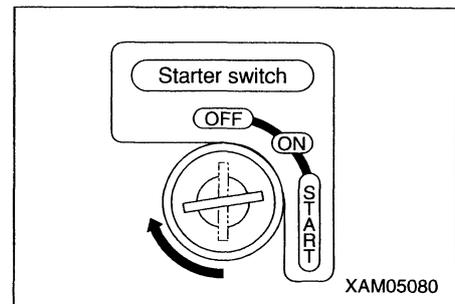
## 1. Checking the Monitor Limiter

### ⚠ WARNING

If any abnormality is found in connection with the moment limiter, immediately contact your dealer.

Checking the safety system prior to starting crane work is mandatory.

1. Referring to Part III Operation 2.1 Checks before starting up engine, conduct checks and verification.
2. Turn the starter switch key to Start position and start the engine.
3. Make sure that display of moment limiter is correct.
  - When the boom length is minimum, check to see that the display of boom length reads “3.7”.
  - After extending the boom to maximum, check to see that the display of boom length reads “12.5m”.
  - With boom length being “6.5m” and boom angle at “0 degree”, make sure that the display of working radius reads “6.2m”.
  - Have a weight, the mass of which known, ready. Lift the weight and make sure that value of weight mass + 0.03t (mass of hook block) and display of current load coincides (with 2 part and 4 part reeving). However, depending on boom condition, slight error can be caused.



**Maeda Seisakusho Co., Ltd.**

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(As of April 1, 1999)



## **MAEDA MINI-CRAWLER CRANE MC-305C OPERATION MANUAL**

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