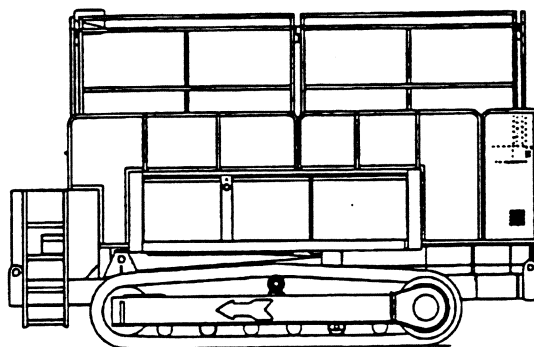


FS-213BS

OPERATION MANUAL
SCISSORS TYPE AERIAL PLATFORM
MODEL RV-093 MODEL RV-123

[STD]
[without Extension deck]



* Important : Please read this manual before operating the machine.

///MACHI
CORPORATION

1152 RYOKE, AGE0, SAITAMA, JAPAN

Introduction

This manual describes correct operation and handling procedure to ensure your operation efficiency, making the maximum use of the machine.

Operation of the machine not in accordance with the instructions in this Manual may cause machine trouble, resulting damage and danger. Please be sure to use the machine correctly.

- * Improper handling and operation of the machine will reduce machine efficiency, possibly causing danger. Please be sure to read and understand this Manual before starting operation.

- * Always attach this manual to the machine.

- * When you transfer this machine, please attach this manual to the machine for the next user.

- * For any doubtful point on handling, inspection or spare parts, please do not hesitate to contact our business offices or authorized service shop nearest to you. In this case, you will be requested to inform the model, serial number, manufacturing date described on the name plate as well.

- * Use only spare parts approved by the manufacturer, particularly for load-supporting and safety-related components.

- * Your attention is called on certain changes in illustration or contents which may be made without notice.

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I. QUALIFICATION OF OPERATOR

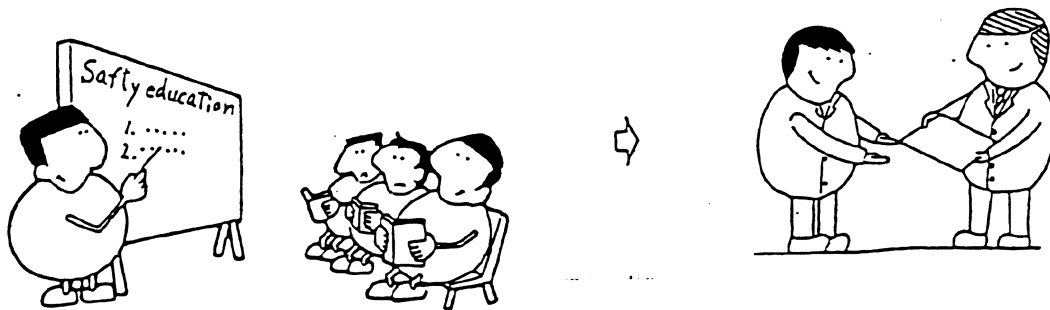
Anybody who operates this machine must receive safety training and education to ensure safe operation of machine.

Safety training and education

It might cause serious danger if this machine is used incorrectly.

All employers are strongly requested to implement safety training and education on those who operate this machine this should include usage of this machine, precaution and operation method.

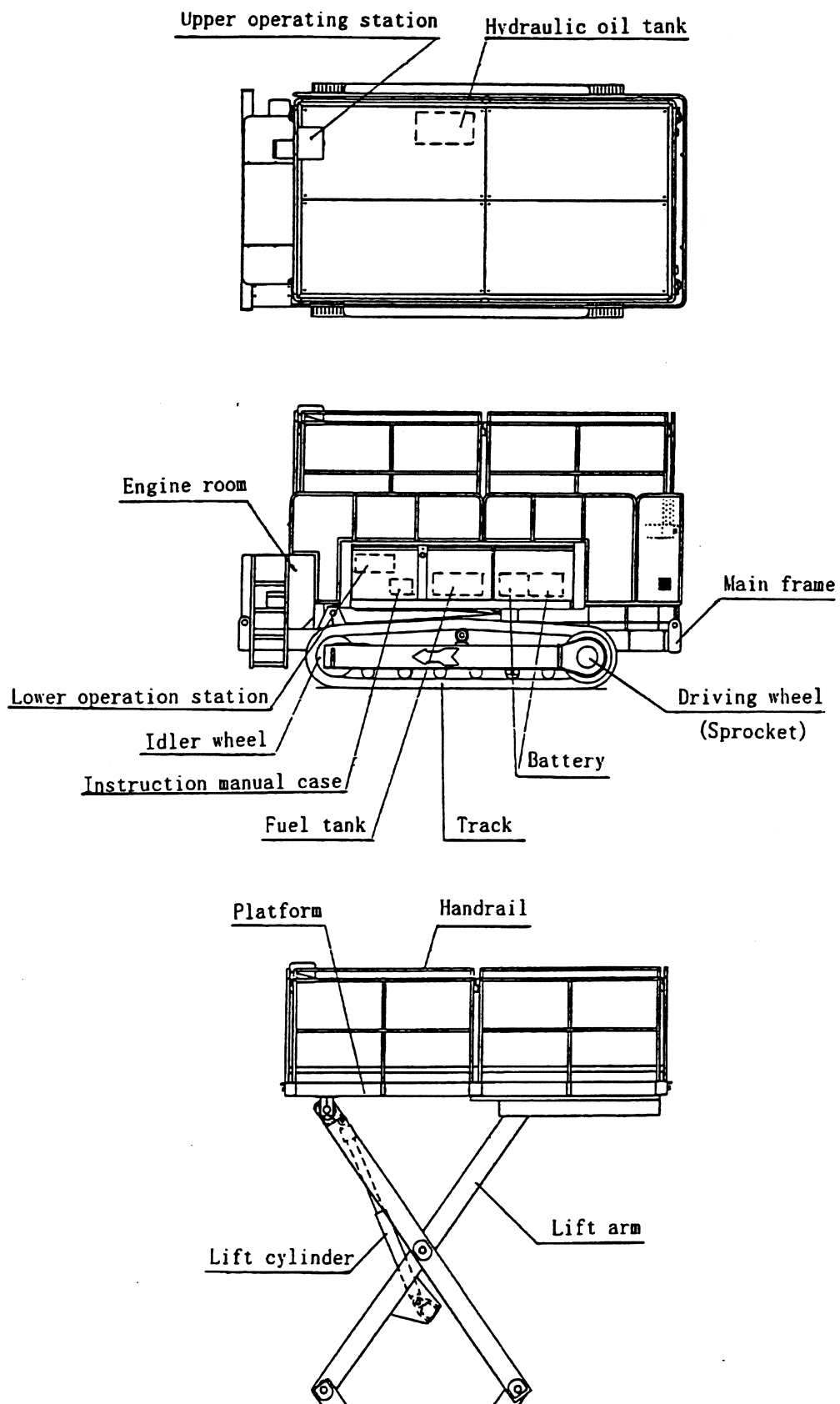
(For information needed for safety training, please refer to this manual.)



Certificate of training course completion

LET' S IMPLEMENT SAFETY EDUCATION !

II. NAME OF EACH PART



III. SPECIFICATIONS

Name			Scissors type aerial platform			
Model			RV-093		RV-123	
Performance	Platform height		9.0 m		11.5 m	
	Rated load		900 kg	9 persons and tools(180kg)	500 kg	5 persons and tools(100kg)
	Maximum allowable slope		3°			
	Travel speed		0~1.7 km/h			
	Platform Elevation speed	Up	45 seconds			
		Down	55 seconds			
Gradability		22°				
Dimension	Overall length		4,390 mm			
	Overall width		2,270 mm			
	Overall height		2,650 mm		2,850 mm	
	Minimum ground clearance		220 mm			
	Inside dimension of work platform		3,730×1,905×1,100 mm			
Machine weight			6,170 kg		6,640 kg	
Rated hydraulic Pressure		Lift	175 kgf/cm ²			
		Travel	210 kgf/cm ²			
Hydraulic oil tank capacity			100 liter			
Battery voltage			24 V			
Engine	Model		Isuzu 4JB1/PA-19			
	Total displacement		2,771 cc			
	Rated output		59.5/2,500 ps/rpm			
	Maximum torque		17.5/2,000 kgf-m/rpm			
	Fuel tank capacity		75 litre			
Maximum allowable manual side force on platform			41 kgf (400 N)			
Maximum ground contact pressure of crawler			0.53 kgf/cm ²		0.56 kgf/cm ²	

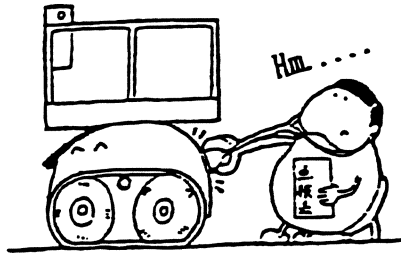
*Airborne noise emissions do not exceed the sound pressure level, at the operating positions, of 85 dB(A).

*Vibrations emitted by the machine should not exceed 0.5m/s² on the "Work platform".

*This machine is designed for indoor and outdoor use.

IV. PERIODIC INSPECTION

To ensure safe operation, periodic inspections are required.

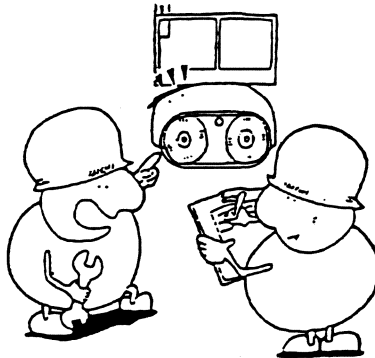


Conduct the monthly and yearly inspections and maintain records for three years.

NOTE:

- Use the service manual for recording inspection results.
- For inspection consult our office or service shop.

**RECORD INSPECTION
RESULT!**



WARNING : When maintenance and repair work is conducted under the platform, use the safety support to prevent the platform from unexpected descent.
(Ref.X-5)

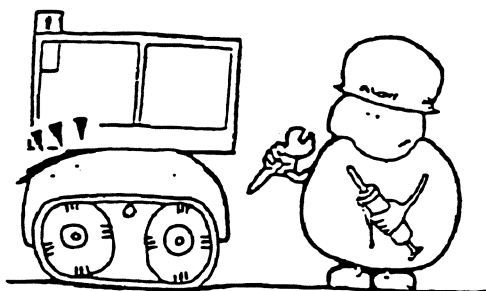
V. PRE-START INSPECTION

Be sure to carry out pre-start inspection before operation in accordance with the following instructions.

NOTE : This inspection must always be carried out before operating a machine which : .

- has been stored for a long time.
- is new.
- has been serviced or repaired.

CARRY OUT PRE-START
INSPECTION!



Inspection should be carried out on firm level ground. Check the following points thoroughly, and do not use the machine if any damaged parts are found.

WARNING : Do not use a faulty machine.

- (1) Check the level of the fuel, engine oil, cooling water and hydraulic oil and refill if necessary.

SUPPLEMENT THE SHORTAGE
IMMEDIATELY !

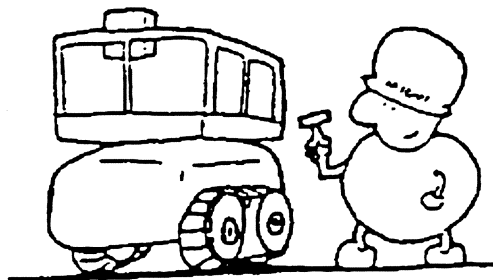


CAUTION : Check hydraulic oil level with the platform fully lowered.

- (2) Check crawler , scissor arms, and the platform for cracks, deformations, and any other damage.

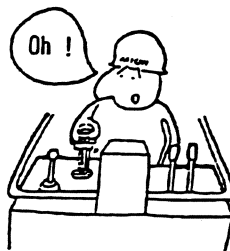
Also check each nut and bolt for looseness or damage.

CHECK EACH PART !



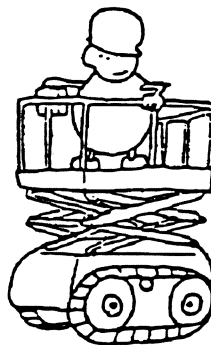
(3) Check on each switch for any damaged or loose wires.

CHECK SWITCH, ETC!.



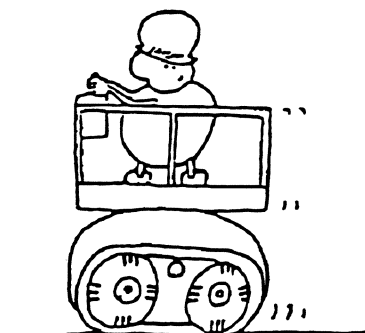
(4) Start engine, and after warming up the machine, repeat the elevation operation to full height several times, and make sure the operation is smooth and does not create any abnormal noises.

CHECK ELEVATION
OPERATION !

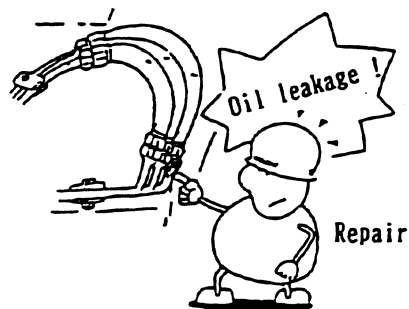


(5) Drive the machine forward and reverse repeatedly, and make sure the operation is smooth and does not create any abnormal noises.

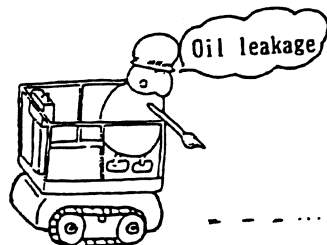
CHECK TRAVEL
OPERATION !



(6) Check the hydraulic components such as the, hoses, pipes for oil leakage.



(7) Check for any trace of oil leakage on the ground after travelling.



(8) Elevate the platform and leave it for some time, and check for evidence of natural descent.



(9) Check all of the decals are readable and replace if necessary.

VI. FOR SAFETY PURPOSE

1. Before starting operation

(1) Only someone who has completed the safety training course and has been designated by the employer should operate this machine.

ONLY THOSE WHO HAVE COMPLETED
THE TRAINING COURSE SHOULD
OPERATE THE MACHINE !



(2) Always wear safety gear such as helmet, safety shoes, etc.

WEAR HELMET AND
SAFETY SHOES !



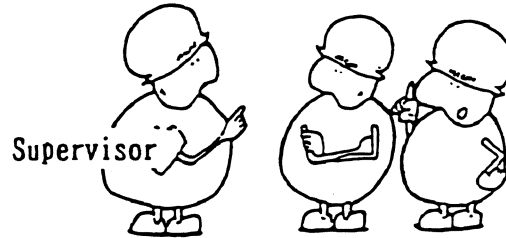
(3) Wear tidy, fitting clothes to avoid their being snagged on the machine.

OPERATE WITH
RIGHT CLOTHES !



- (4) Nominate a supervisor and follow their instruction when operating the machine.

FOLLOW THE SUPERVISOR'S
INSTRUCTIONS !



- (5) Safe operation should always be practised. Be sure to understand and observe any rules and regulations put in place to promote safety.

OBSERVE THE RULES !

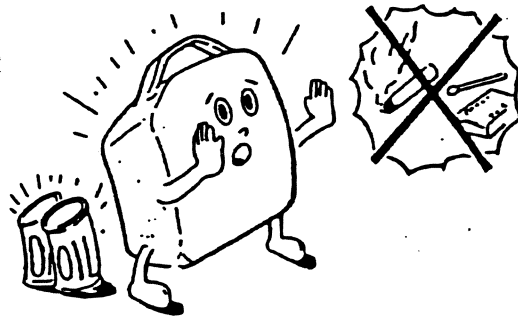


- (6) Be sure to head the matters regulated by the law.

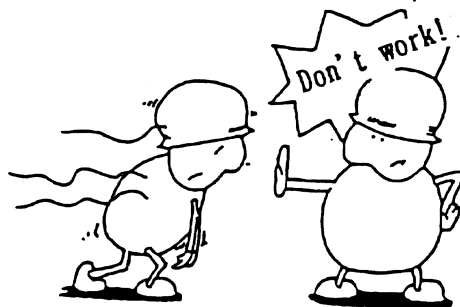
OBSERVE THE LAW !



(7) Take care to keep sparks, fire etc away from flammable substances.



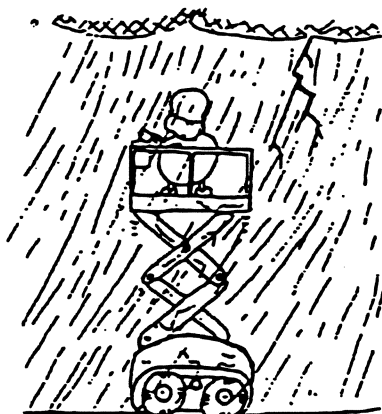
(8) Do not operate the machine when you are intoxicated or exhausted.



WARNING: Only operate this machine if it will not impend your health.

(9) Stop operation in bad weather.

STOP OPERATION IN
BAD WEATHER!



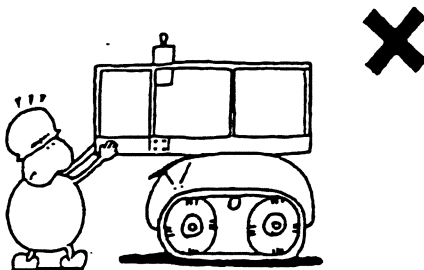
DANGER : * Standard of bad weather

- * Strong wind.....When average wind velocity per 10 minutes is over 12.5m/sec.
- * Heavy rain.....When a rainfall is over 50 mm
- * Heavy snow.....When a snow lays over 25 cm deep.
- * Thunder
- * It is advisable to operate the machine in the atmospheric temperature
-20° ~+40°

DANGER : * Even if the weather conditions are below the standard mentioned above,
follow the instruction of supervisor.

(10) Do not carry out any modification to the machine without obtaining the
manufacture's approval.

MODIFICATION IS
PROHIBITED !



Do not add anything to the machine which may increase the wind load.
e.g. "Notice board" on the platform.

- (11) Do not wash the electric components of machine.
(especially never use pressurized water)

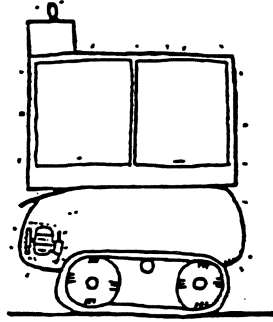


ADVICE : Wipe off any dirt with a dry cloth, etc.

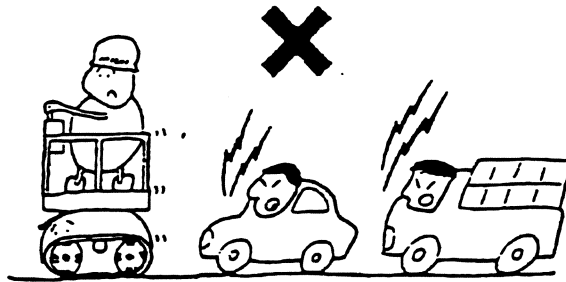
- (12) Ensure the removable handrails have been re-installed.

2. During operation

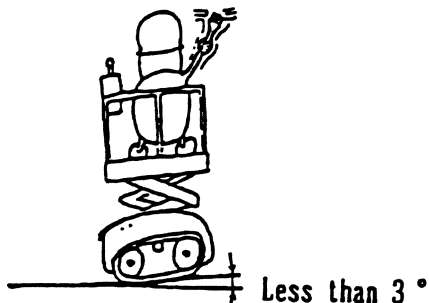
- (1) After starting engine, warm up the machine sufficiently with low speed revolution.



- (2) This machine is not allowed to travel on a highway.



(3) Only use the machine on firm level ground.



DANGER : • Do not elevate platform on soft or uneven ground. The maximum ground contact pressure of the machine is as listed below.

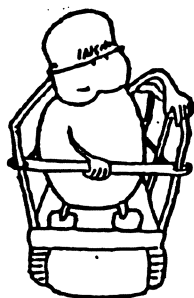
RV093: 0.53kgf/cm²

RV123: 0.56kgf/cm²

• Do not elevate platform on a slope which exceeds 3° .

(4) After getting on the platform, be sure to return the entrance bar to the closed position.

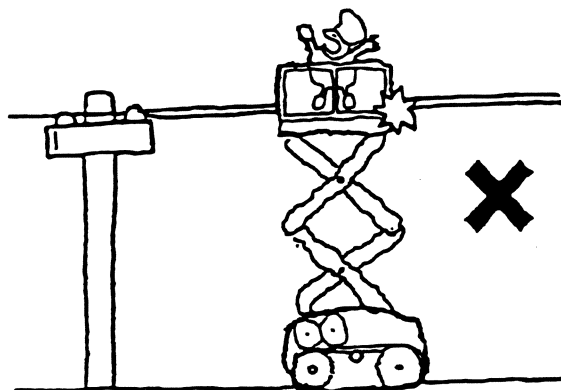
CLOSE THE GATE
AFTER GETTING ON
THE PLATFORM !



(5) Do not use the machine in the vicinity of electrical conductors.

ELECTROCUTION

HAZARD !



DANGER : * This machine is not insulated. Do not approach or make contact with POWER LINES.

* Keep a safe distance away from ELECTRICAL CONDUCTORS or DEATH or SERIOUS INJURY will result.

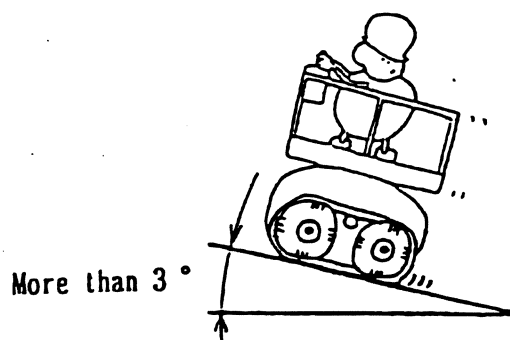
Voltage range		Minimum safe approach distance
Low voltage	0 ~ 600 V	1 meter
High voltage	600 ~ 7,000 V	1.2 meter
Extremely high voltage	7,000 ~ 60,000 V	2 meter
	Over 60,000 V	additional 0.2 meters distance for each additional 10,000 V

(6) Be sure to fasten safety belt, and hook the harness of the safety belt onto a handrail after getting on the platform.

FASTEN SAFETY BELT !



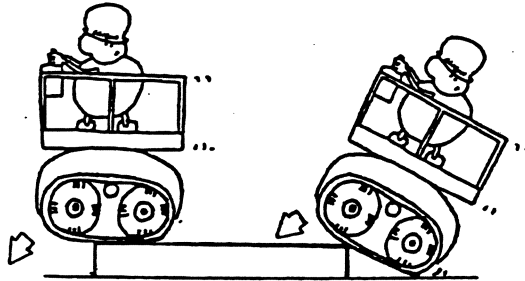
(7) When you travel on a slope of more than 3° for transportation purposes, drive the machine slowly with the platform fully lowered.



DANGER : Do not travel on any slope which exceeds 22°

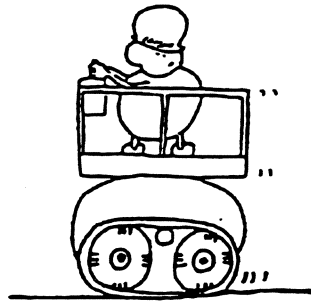
(8) When traveling up or over a step or curb, move the machine very slowly.

This is important because the machine will incline suddenly just after the machine's gravity center has passed over the step.



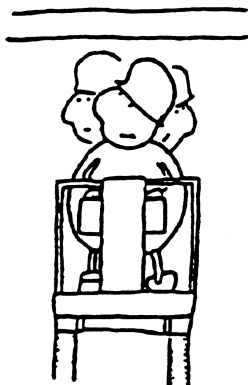
(9) Use the machine carefully.

OPERATE CAREFULLY !



WARNING : When the machine must travel with the platform raised care should be taken to ensure that the route is reasonably level and flat.

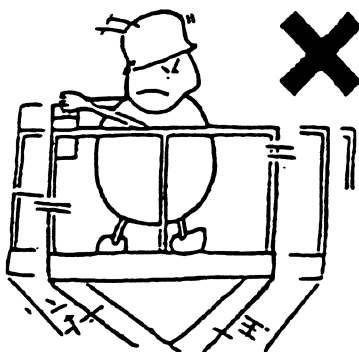
(10) Check the surrounding situation carefully before starting operation.



WARNING : * Always check for any obstacles such as a beam, which may block your path when elevating the platform or travelling.

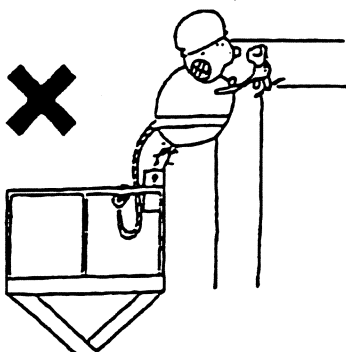
* Be careful not to put your hand between hand rail of platform and any other obstacles.

(11) Do not operate control levers or switches roughly.



DANGER : When you wish to operate the machine in the opposite direction, stop your operation first, then start again.

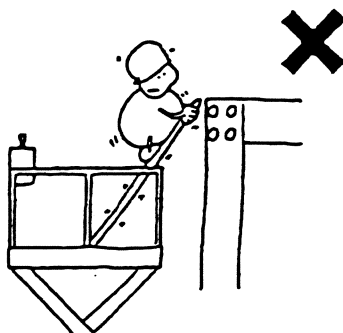
(12) Do not lean out of the platform.



WARNING : * Do not stand on the handrail.

* Always stand in a stable manner when on the platform

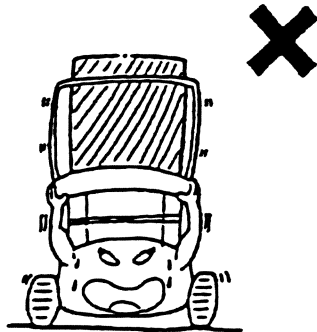
(13) Do not use a ladder or step on the platform.



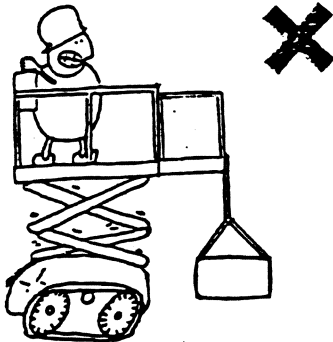
DANGER : Do not operate the machine without the handrail in place. You may fall.

(14) Do not overload the platform.

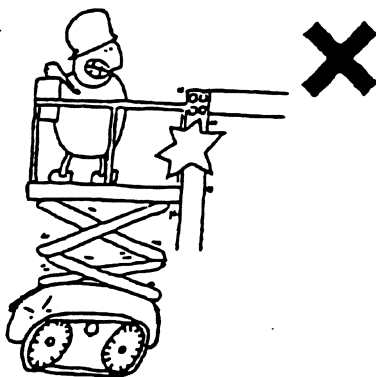
S.W.L, is marked on the platform.



(15) Do not hoist up any object with a hook or rope installed on the platform.

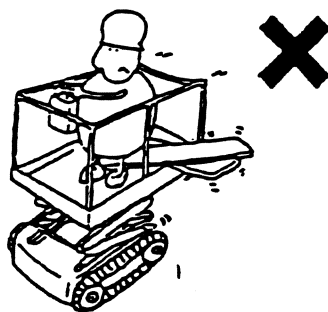


(16) Take care not to hit any other objects or when driving the machine and/or raising/lowering the platform.

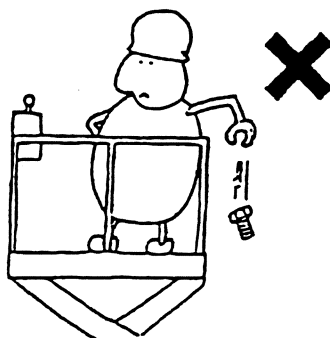


CAUTION : Collusion with another structure may result in damage to the machine.

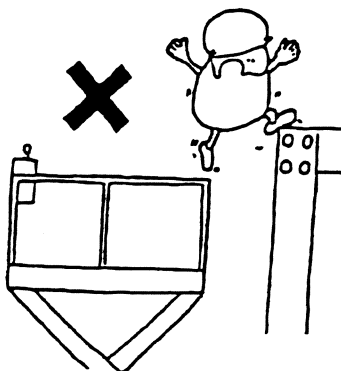
- (17) When loading materials onto the platform place them in the centre of the platform as to help keep the platform stable. Do not allow anything to protrude out of the platform.



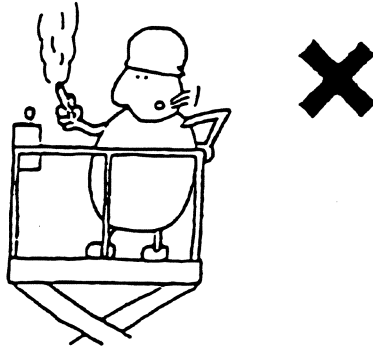
- (18) Do not drop any object from the platform.



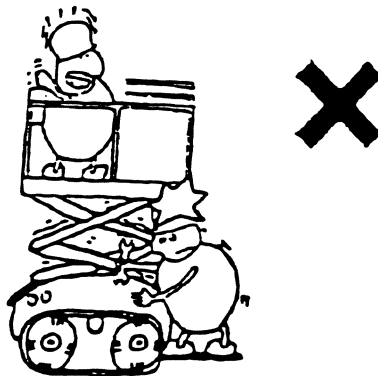
- (19) Do not jump from the platform to any other structures.



(20) Do not allow fires or smoking in the platform.

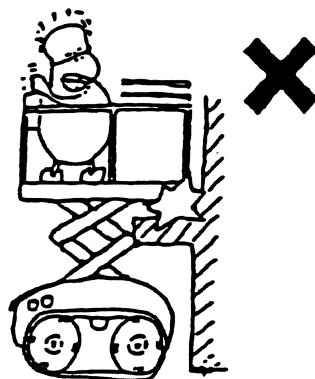


(21) Never allow any person or object underneath the platform after the platform is lifted.

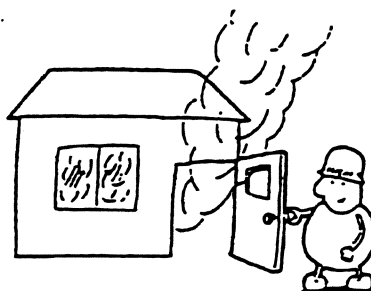


CAUTION : Do not put any object on the side cover or engine cover. It may be caught between the platform resulting in danger.

- (22) Take care to avoid contact between the lift and other structures. Contact with other structures may cause damage to the scissors.



- (23) Always allow sufficient ventilation, when using machine in enclosed buildings.



- (24) When gas cutting and arc welding, etc, take the necessary measures to cover the machine so that no sparks or hot fragment fall on the machine, especially on battery and hydraulic hoses.

DANGER : If a welding spark , etc. enters into the machine, it may cause a fire resulting in danger, and damage to machine.

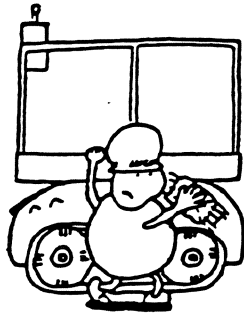
(25) If any abnormality is found on the machine during operation, stop operation immediately and conduct an inspection to identify and rectify the problem.

WARNING : For safety and prevention of unauthorized use always remove the key when the machine is not in use.

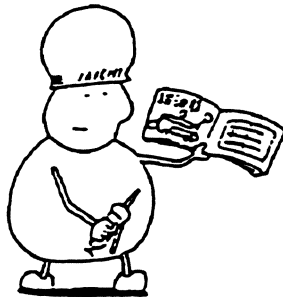
VII. PRECAUTIONS FOR LONG TERM STORAGE

(1) Clean each part.

CLEAN EACH PART BEFORE STORING THE MACHINE !

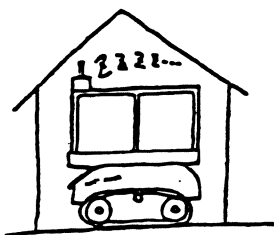


(2) Lubricate each part by following the "Lubrication chart and table".



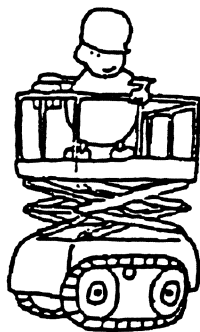
- (3) Store the machine inside a dry building. If you have to leave the machine outdoors, park it on firm level ground and keep it covered with a waterproof sheet.

STORE THE MACHINE INSIDE !



- (4) When the machine is stored for a long time, carry out the following operations periodically:

- *Carry out lift operation regularly to keep ram parts lubricated.
- *Perform travelling operation regularly to prevent rust from forming on the tracks.



VIII. SAFETY DEVICE

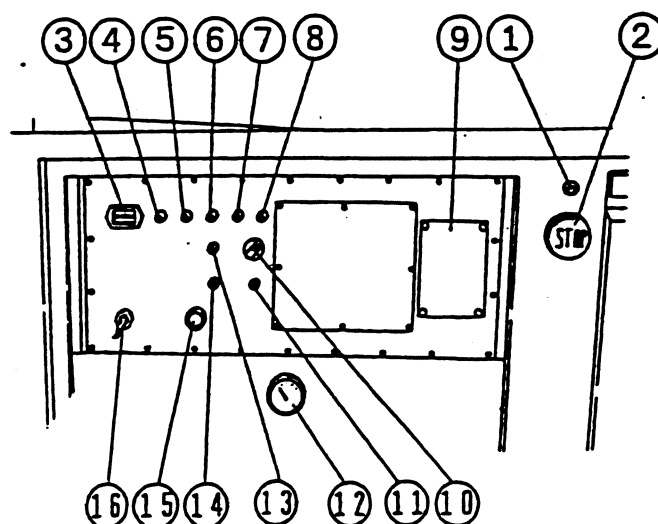
Safety devices are fitted for safe operation and prevention of accident.

Name	Main function
Relief valve	Protect the hydraulic system by limiting the maximum hydraulic pressure.
Elevation safety device (Holding valve)	Prevent natural descent of platform when hose is damaged.
Motion alarm buzzer	During travel and platform lifting operation, an alarm sounds, warning people in the surrounding area.
Stop switch	The switch can be pressed in an emergency to completely shut down all of the functions.
Lift limit device	When the machine is on a slope of more than 3° , the slope warning lamp(red) lights, the alarm sounds, and lift operation stops.

Name	Main function												
Travel limit device	1. If the platform exceeds the rated height, high speed travel becomes unavailable. <table><tr><td>Model</td><td>RV-093</td><td>RV-123</td></tr><tr><td>Rated height</td><td>at.2m</td><td>at.2m</td></tr></table> 2. If the platform exceeds a second rated height, travel becomes completely unavailable. <table><tr><td>Model</td><td>RV-093</td><td>RV-123</td></tr><tr><td>Rated height</td><td>at.4.5m</td><td>at.6m</td></tr></table> 3. If the platform height exceeds 2m and slope is more than 3° , travel operation becomes unavailable.	Model	RV-093	RV-123	Rated height	at.2m	at.2m	Model	RV-093	RV-123	Rated height	at.4.5m	at.6m
Model	RV-093	RV-123											
Rated height	at.2m	at.2m											
Model	RV-093	RV-123											
Rated height	at.4.5m	at.6m											
Overload protection Device (Pressure switch)	If the platform is overloaded, the overload indicator lamp(red)lights, a buzzer sounds, and lift up operation is automatically stopped. Overload protection device, however operates only when the platform is near the lowest position. When loading an object onto the platform when raised Be sure not to overload the platform.												
Engine safety device	1.If engine oil pressure drops due to oil shortage or oil pump failure, the engine is stopped automatically and a warning buzzer sounds. 2.If the engine becomes overheated, the engine will stop 2 to 3 seconds after starting to prevent damage to the engine.												
Upper preferential device	When any operation is attempted from both the upper and lower control panels simultaneously, the upper control panel takes precedence.												
Travel and lifting Simultaneous operation Protection device	Travel and platform lifting operations cannot be carried out simultaneously. If both operations are attempted simultaneously, machine operation stops.												

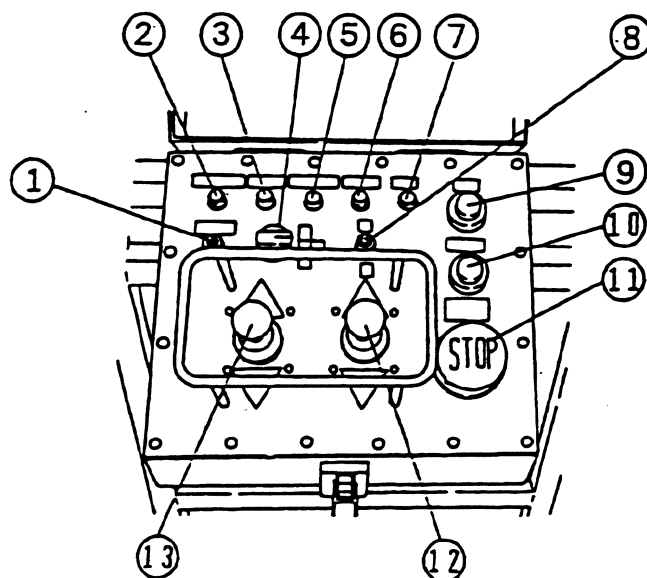
IX. CONTROL PANELS

1. Lower control panel



No.	Name
1	Power indicator lamp
2	Stop switch
3	Hour meter
4	Engine oil warning lamp
5	Overheat warning lamp
6	Charge warning lamp
7	Overload warning lamp
8	Slope warning lamp
9	Fuse holder
10	Accelerator switch
11	Lift switch
12	Fuel level gauge
13	Alarm stop switch
14	Upper control cancel switch
15	Preheating indicator
16	Engine key switch

2. Upper control panel



No.	Name
1	Alarm stop switch
2	Slope warning lamp
3	Overload warning lamp
4	Accelerator switch
5	Travelling position lamp
6	Fuel level lamp
7	Power indicator lamp
8	Lift switch
9	Engine start switch
10	Horn switch
11	Stop switch
12	Right travel control lever
13	Left travel control lever

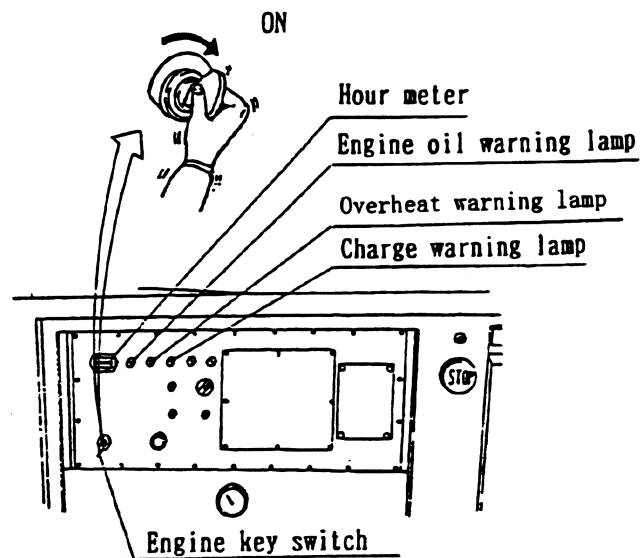
X. OPERATION METHOD

1. Engine start operation

Follow the procedure mentioned below:

- (1) Turn the engine key switch on the lower control panel to "ON" position.

When the engine key switch is turned to "ON" position, the engine oil warning lamp and charge warning lamp light and hour meter will switch on.



(1.1) Engine oil warning lamp

After the engine is started, this lamp will turn off.

If the lamp lights during operation, a problem in the engine lubricating system has occurred. (e.g low oil level, oil leakage or filter blockage).

(1.2) Overheat warning lamp

If the lamp lights during operation, there is defect in engine cooling system, such as shortage of cooling water or failure of fan belt.

WARNING : Do not remove radiator cap when the engine is hot. Hot water may splash out, causing danger.

NOTE : This lamp lights only when the temperature of the cooling water is abnormally high. It does not light when the engine key switch is turned to "ON".

(1.3) Charge warning lamp

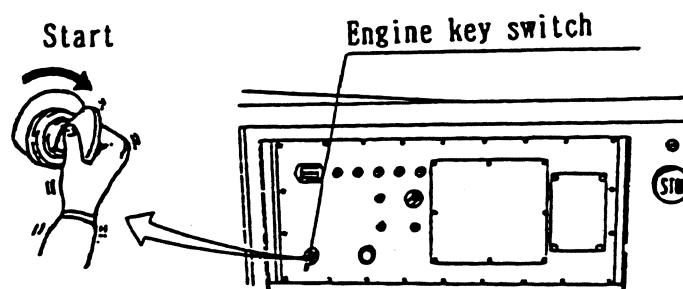
After the engine is started, the lamp turns off.

If the lamp turns on during operation, it indicates a failure in the charging system.

(1.4) Hour meter

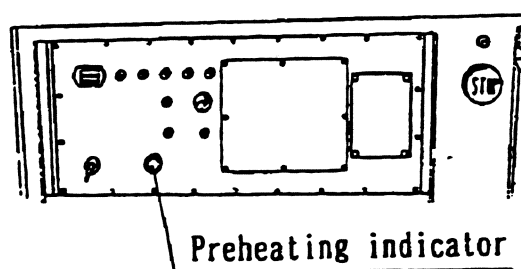
The hour meter indicates the total number of hours the machine has operated for. Therefore it is used to determine when maintenance needs to be carried out. (e.g, every 300 hours or as indicated in the service manual).

(2) Turn the engine key switch to "START" position.



CAUTION : * Once the engine has started, remove your hand immediately from the engine key switch.

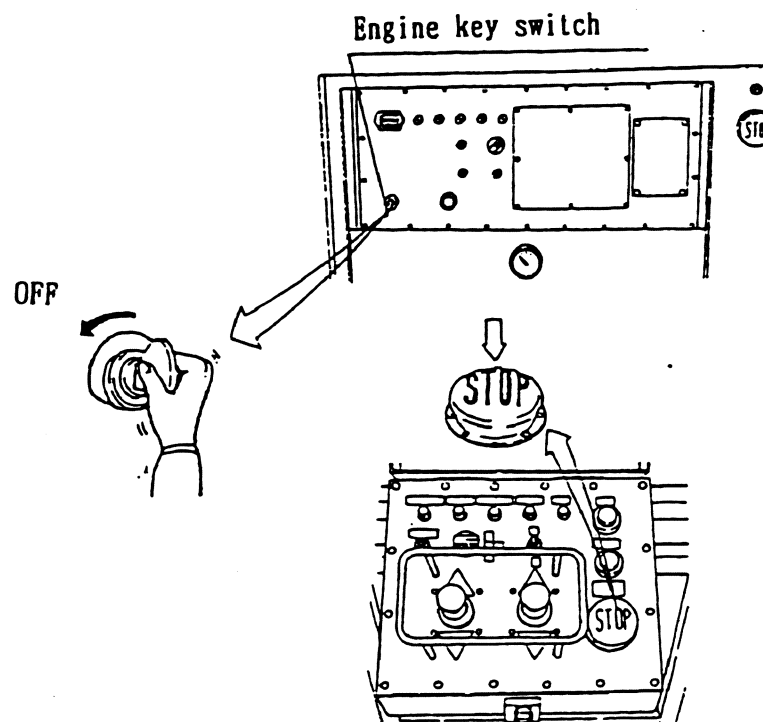
- * For about 10 seconds after the engine is started, revolution of the engine increases automatically regardless of the position of accelerator switch.
- * Do not hold the engine key switch to "START" position for more than 10 seconds. This may result in damage to the starter motor.
- * When the engine is started for the first time each day, or when the engine has been stopped for a long time, turn the engine key switch to "PREHEAT" position, and start after preheating indicator glows.
(Especially in winter season.)



(3) After starting the engine, let it warm up for about 5 minutes.

2.Engine stop operation

To stop the engine, press the engine stop switch on the upper control panel or turn the engine key switch on the lower control panel to "OFF" position. It is recommended to let the machine idle without a load for about 3 minutes before turning off, this will allow the engine to cool down.



CAUTION : If the engine is stopped with the stop switch, be sure to turn the engine key switch back to "OFF" position.

3. Operation at lower control panel (Ground control)

3.1 Accelerator

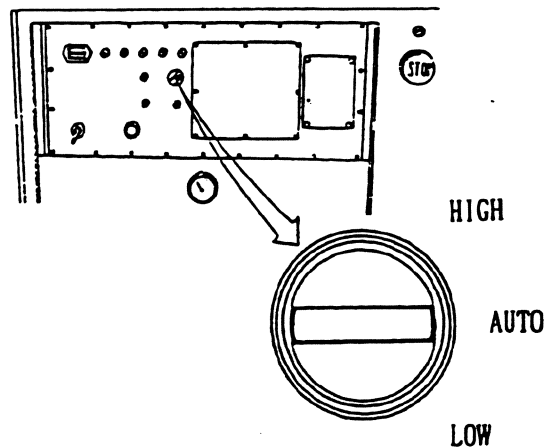
This engine speed is conducted by the accelerator switch.

* To increase engine speed. Switch to "HIGH".

* To decrease engine speed. Switch to "LOW".

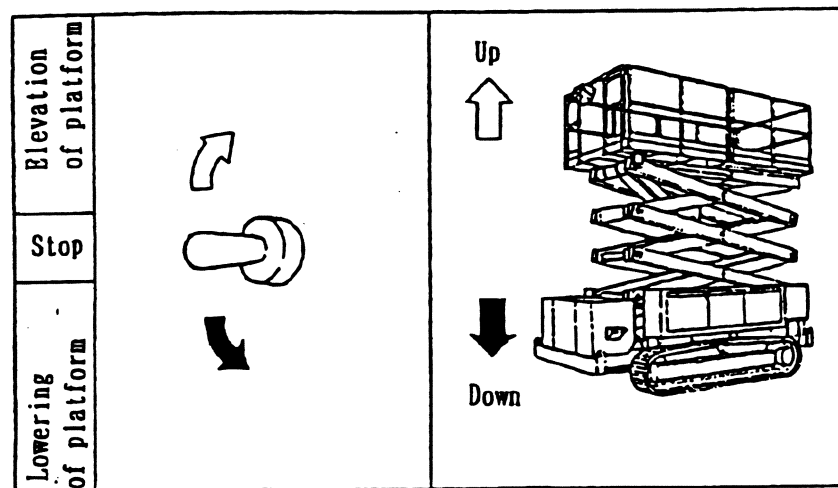
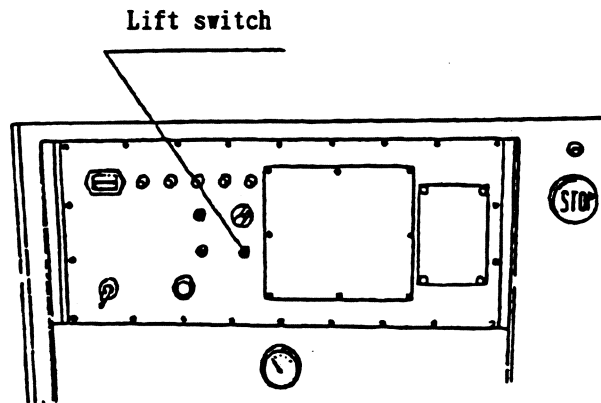
* To increase engine speed
only when travelling or lif-
ting operations are carried out. . . .Switch to "AUTO".

NOTE : * The "AUTO" selection should be used for any ordinary operation.
* There is an accelerator switch on both the upper and lower control panels.
* The accelerator switch on the upper control panel takes precedence. If
you want to give precedence to the accelerator switch on the lower
control panel, turn on "Upper control cancel switch".



3.2 Lift operation

The lifting of the platform is controlled by means of the lift switch.

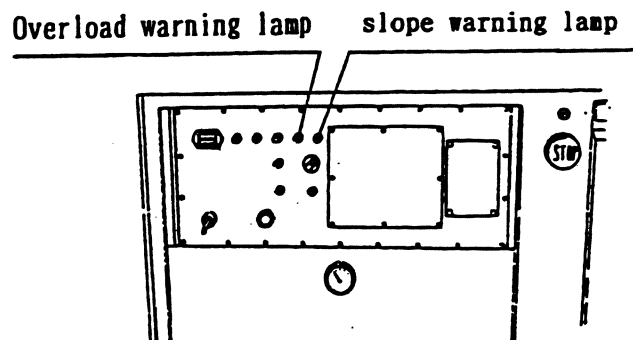


ADVICE : "Motion alarm buzzer" sounds automatically, when the lift switch is operated.

CAUTION : When the platform is in excess of the maximum loading capacity, the overload warning lamp (red) lights and the alarm sounds. In such an event, platform elevation becomes inoperative.

WARNING : When the load is heavy, lift up the platform using "LOW" engine speed.
If the platform is lifted up using "HIGH" engine speed, the overload protection system starts to operate even it is within the rated load.

ADVICE : When the machine is inclined more than 3° , the slope warning lamp (red) lights and an alarm sounds, making lift up operation inoperative.



DANGER : Do not operate the machine if the handrail is not installed the on platform.

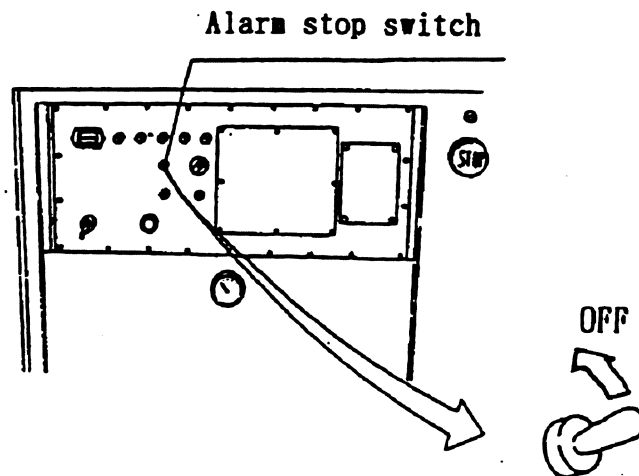
ADVICE : Lift and travel operations can not be carried out simultaneously.

3.3 Alarm stop operation

This operation is conducted by means of alarm stop switch.

The alarm buzzer sounds automatically in such cases as the platform is overloaded or the machine is on an excessive slope.

To stop the alarm buzzer, turn on the "alarm stop switch".



ADVICE : * The "Motion alarm buzzer" which sounds during lift or travel operation cannot be stopped by the "Alarm stop switch".

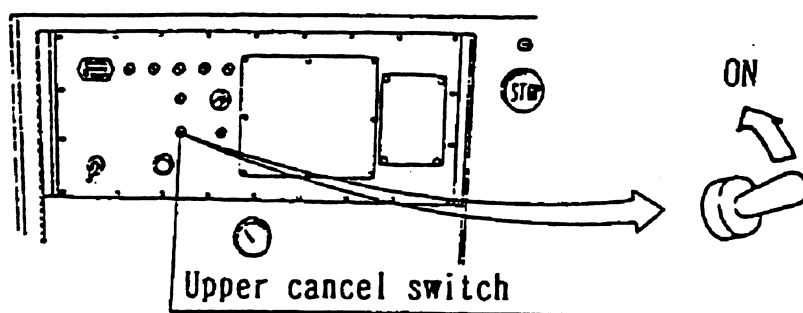
* The alarm stop switch is located on both the upper and lower control panels.

3.4 Upper control cancel operation

The use of the upper controls can be cancelled by means of the upper control cancel switch. You may need to cancel operation from the upper control in the following cases:

- *In case the machine becomes uncontrollable by means of control levers and switches on upper control panel.
- *When you want to give precedence to lower control.

CAUTION : When the upper control cancel switch is not operated, the operation on the upper control panel takes precedence.



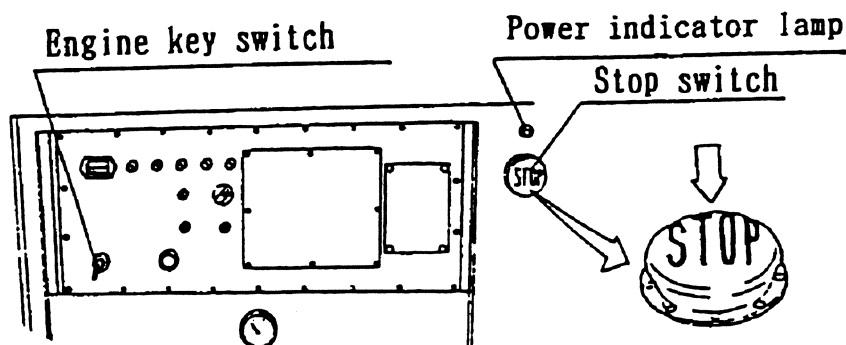
3.5 Stop operation

To stop the machine, press the operation stop switch.

When the stop switch is pressed, the power indicator lamp turns off, the engine stops and all operations become inoperative.

Operation should be stopped in the following cases:

- (1) To stop the engine.
- (2) When a person on the ground judges that upper operation is dangerous.
- (3) When operation becomes uncontrollable by means of control levers or switches.

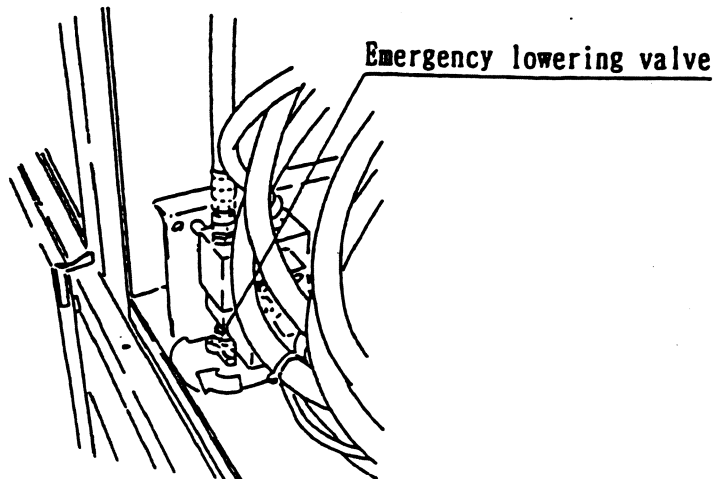


NOTE: To reset the main power, firstly turn the key switch to "OFF", then start engine by the key switch.

WARNING : If a malfunction occurs, stop operation immediately, and contact our authorized service shop.

3.6 Emergency lowering operation

If the platform can not be lowered due to machine failure, open the emergency lowering valve installed on the right side of the machine, and lower the platform.



DANGER : When it is necessary to manually lower the platform, open the "Emergency lowering valve" gradually and lower the platform slowly.

WARNING : When emergency lowering operation is carried out due to machine failure, do not attempt to re-operate the machine and contact our authorized service shop immediately.

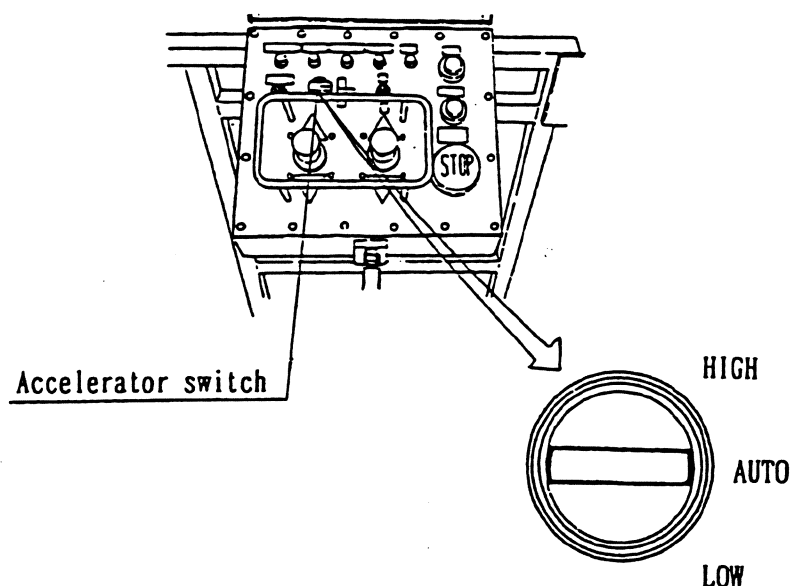
4. Operation at upper control panel (Upper control)

DANGER : When operating the machine from the upper control panel, be sure to fasten the safety belt.

4.1 Accelerator operation

This operation is controlled by means of the accelerator switch.

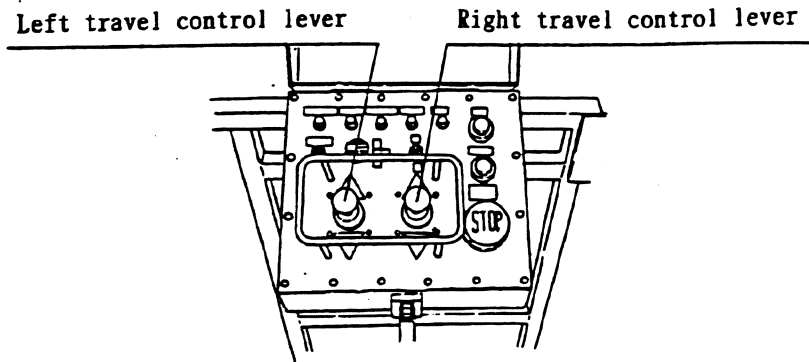
- * To increase engine speed..... Switch to "HIGH" position.
- * To decrease engine speed..... Switch to "LOW" position.
- * To increase engine speed only when travelling or lifting operations are carried out.... Switch to "AUTO" position.



NOTE: Switch accelerator switch to "HIGH" position only when warming up the machine, and turn it to "AUTO" or "LOW" position during operation.

4. 2 Travel operation

This operation is controlled by two travel control levers (right and left).

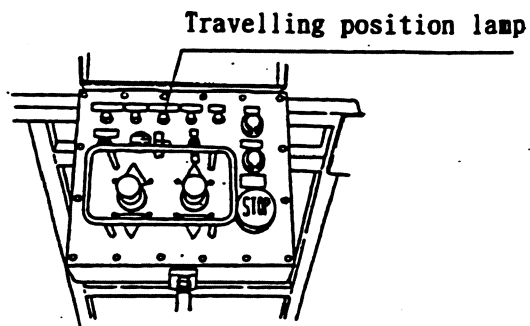


4.2.1 Matters

- (1) The safety system limits the travel operation in accordance with the height of the platform, as shown in the table below.

Model	Height of platform	
	RV-093	RV-123
Restrictions		
High speed travel	2.0m	2.0 m
Unavailable	or higher	or higher
Travel unavailable	4.5 m	6.0 m
	or higher	or higher

NOTE : When travel operation is available, the travelling position lamp (blue) turns on.



(2) Travel and lift operations can not be carried out simultaneously.

WARNING : When lift operation is activated during travel operation, travel stops, and lift operation takes precedence.

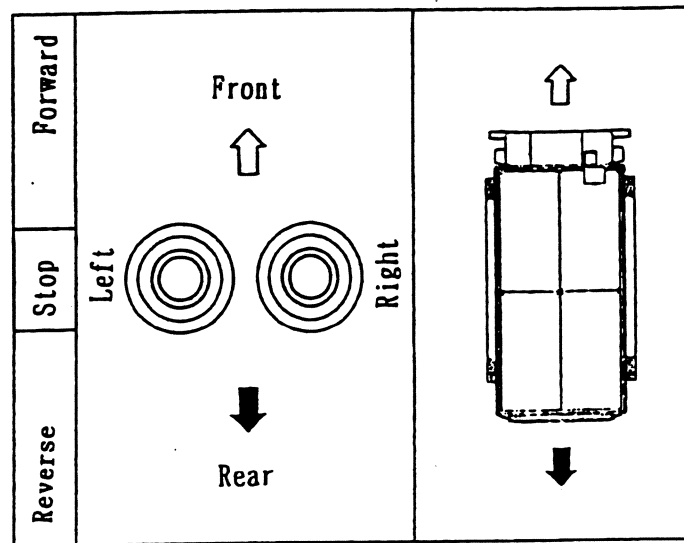
It is not advisable to operate lift while travelling, as travel will stop suddenly and cause excessive shuddering.

4.2.2 Operation method

(1) Forward & reverse

This operation is conducted by means of two travel control levers.

Operate both of the control levers to the same direction to travel straight forward or reverse.

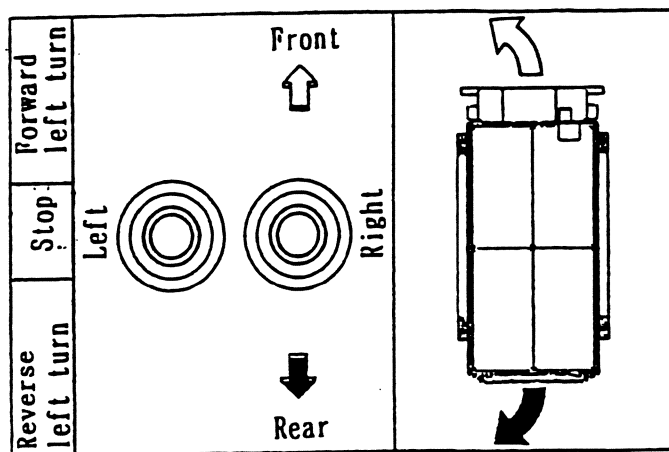


NOTE: Motion alarm buzzer sounds automatically, when travel control lever is operated.

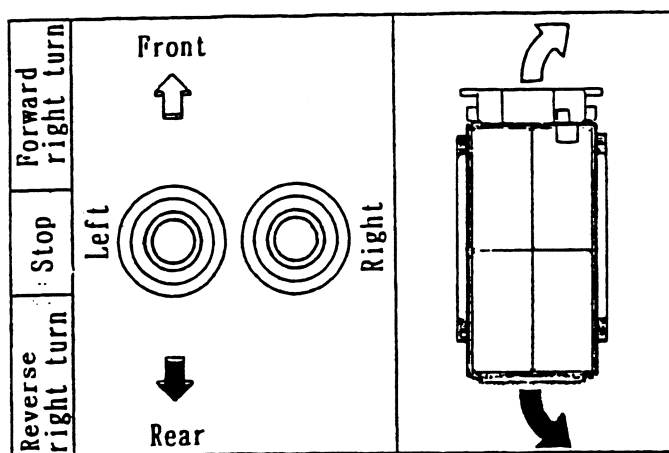
(2) Course change operation

① Direction change from stationary position (Pivot turn)

(a) Forward & reverse left turn



(b) Forward & reverse right turn

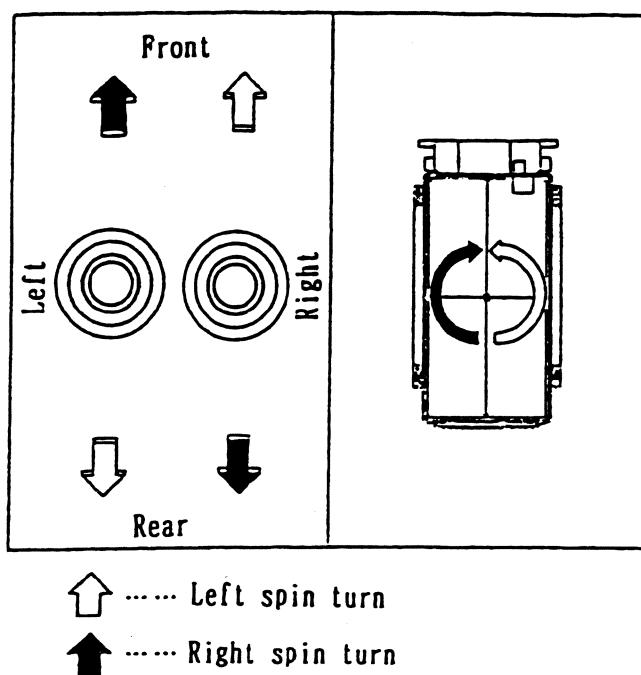


② course change during travelling (pivot turn)

Turn left..... Return only the left travel control lever to neutral position.

Turn right..... Return only the right travel control lever to neutral position.

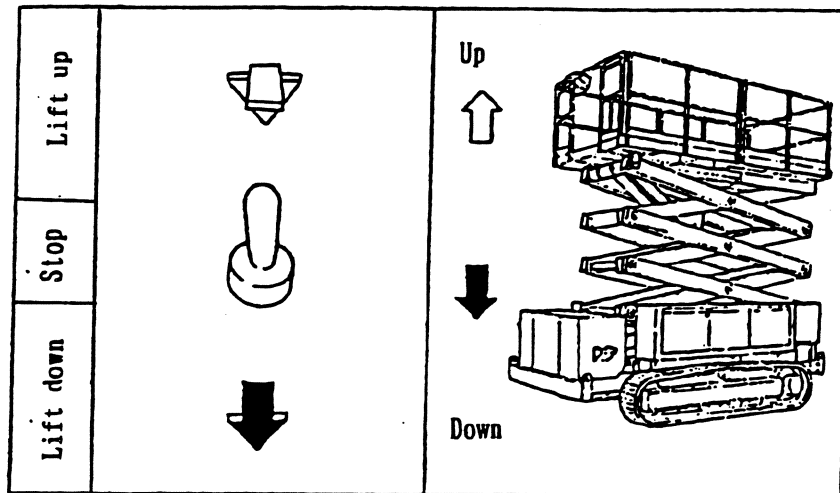
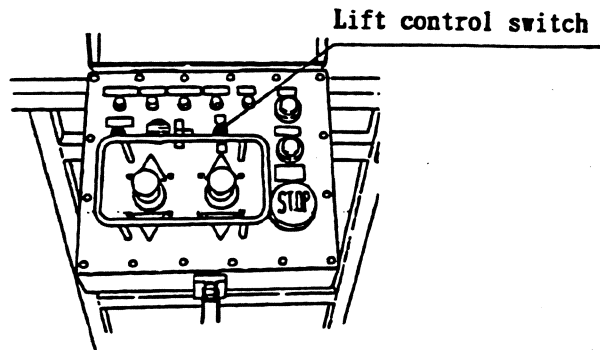
③ Course change within the minimum diameter (spin turn)



WARNING: Only begin a spin from a completely stationary position.

4.3 Lift operation

This operation is controlled by the lift control switch.

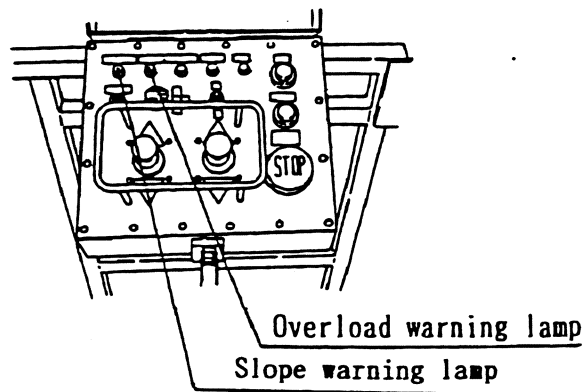


ADVICE : Motion alarm buzzer sounds automatically, when the "Lift control switch" is activated.

CAUTION : When the platform is over loaded, overload warning lamp (red) lights and an alarm sounds. In such an event lift up operation also becomes inoperative

WARNING : When the load is heavy, elevate the platform using "LOW" engine speed. If the platform is lifted up using "HIGH" engine speed, the overload protection device starts to operate even within the pre-determined limit.

NOTE: When the machine is inclined more than 3° , the slope warning lamp (red) lights and alarm sounds, making lift up operation inoperative.



WARNING: Do not operate the machine if handrails are not installed on the platform.

NOTE: Both lift and travel operations cannot be carried out simultaneously.

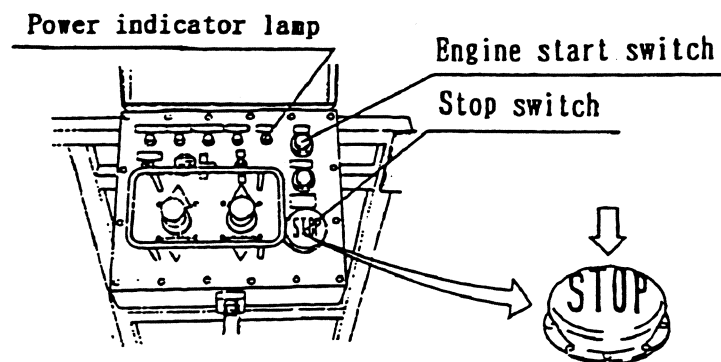
4.4 Stop operation

To stop the machine, press the operation stop switch.

When the stop switch is pressed, the power indicator lamp turns off, the engine stops and all operations become inoperative.

Operation should be stopped in the following cases:

- (1) To stop the engine.
- (2) When operation becomes uncontrollable by means of control levers or switches.



DANGER : When working on the platform for a long time without operating machine, press the stop switch to avoid accidental operation of levers etc.

NOTE: To reset the main power, press the "Engine start switch" .

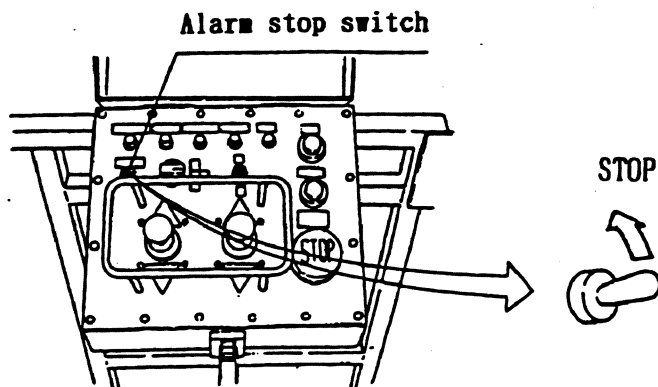
WARNING : When the stop operation has been performed due to malfunction, stop operation immediately, and contact our authorized service shop.

4.5 Alarm stop operation

This operation is conducted by means of alarm stop switch.

The alarm buzzer sounds automatically in such cases as the platform is overloaded or the machine is on an excessive slope.

To stop the alarm buzzer, turn on the "alarm stop switch".



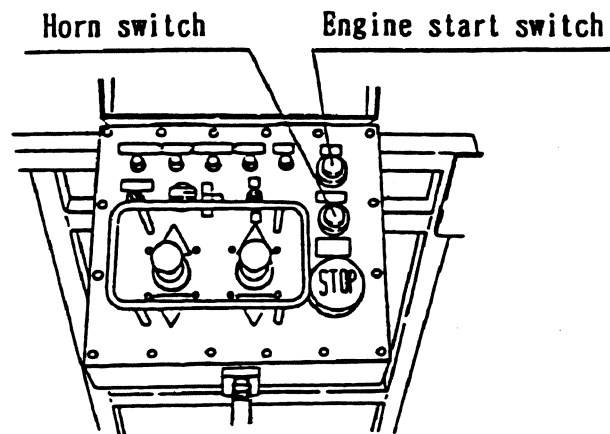
ADVICE : * The "Motion alarm buzzer" which sounds during lift or travel operation cannot be stopped by the "Alarm stop switch".

* The alarm stop switch is located on both the upper and lower control panels.

4.6 Horn operation

The horn is operated by pressing the horn switch.

Always sound the "Horn" before operation to warn personnel in the working area.



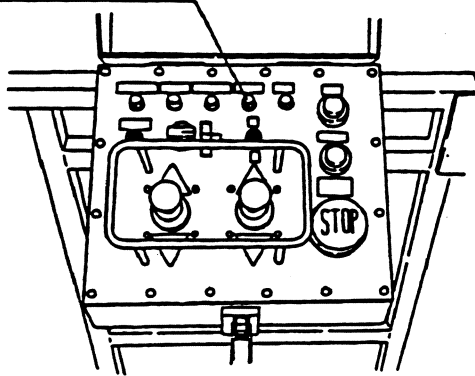
4.7 Engine start operation

To start the engine, press the engine start switch.

4.8 Fuel level lamp

When the level of the remaining fuel reaches approximately 5 liters, fuel level lamp (red) on the upper control panel lights. When the fuel level lamp is lit, stop the engine and refuel immediately.

Fuel level lamp



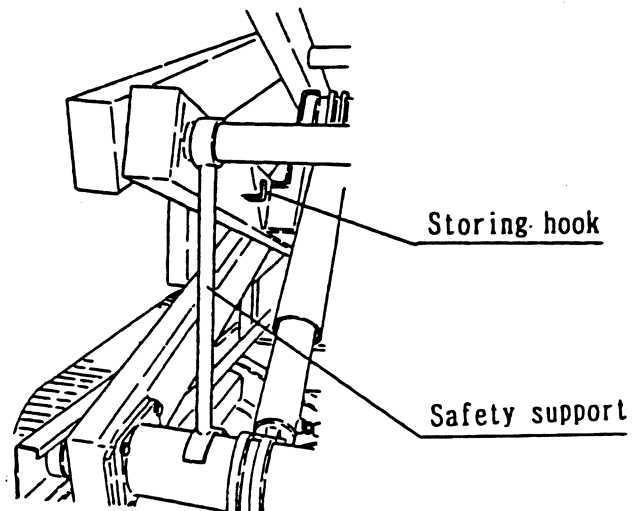
4.9 Automatic air bleeder operation

It is not necessary to manually bleed air from fuel system of engine as there is an automatic air bleeding system installed.

If the engine stops due to fuel shortage, refill fuel, and crank the engine until it starts.

5. Safety support

When conducting an inspection from underneath the platform, be sure to unload the platform, and set the “safety support” as shown in the figure below to prevent the platform from unexpected descent.

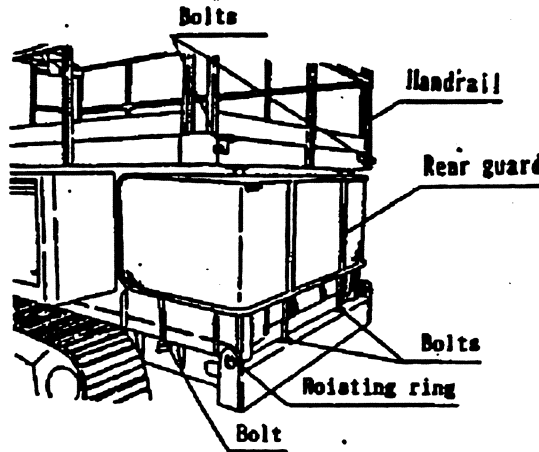


NOTE : When the safety support is not in use, be sure to store it on the storing hook.

XI. TRANSPORTATION METHOD

1. Loading by crane

- (1) Lower the platform completely and check that it is totally empty.
- (2) Remove all of the handrails and the rear guard (refer to figure below).



- (3) Set the sling ropes or chains securely as show in the figure and hoist up the machine up.

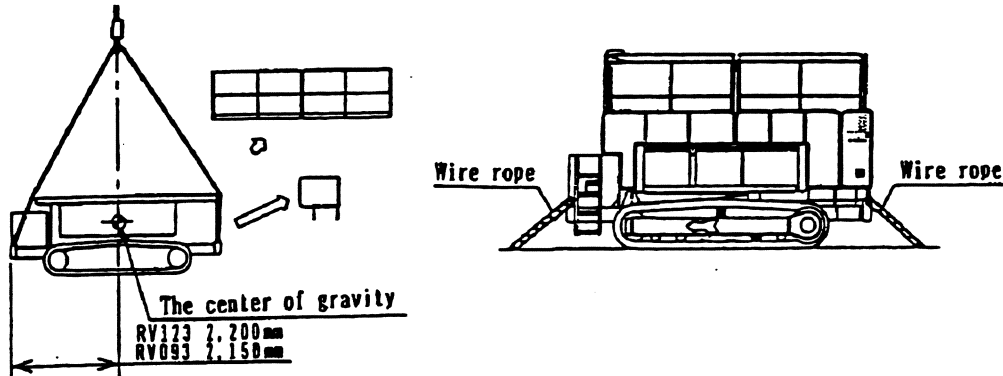
WARNING: Ensure the strength of the sling ropes or chains is adequate to lift the machine up.

The overall weight of the machine is as listed below.

RV-093.....6,170kgf

RV-123.....6,640kgf

- (4) Load the machine on the transport vehicle, and tie down on the vehicle bed securely.



CAUTION : Be sure to reinstall the "Hand rails" and "Rear guard", and fasten them with bolts before using the machine.

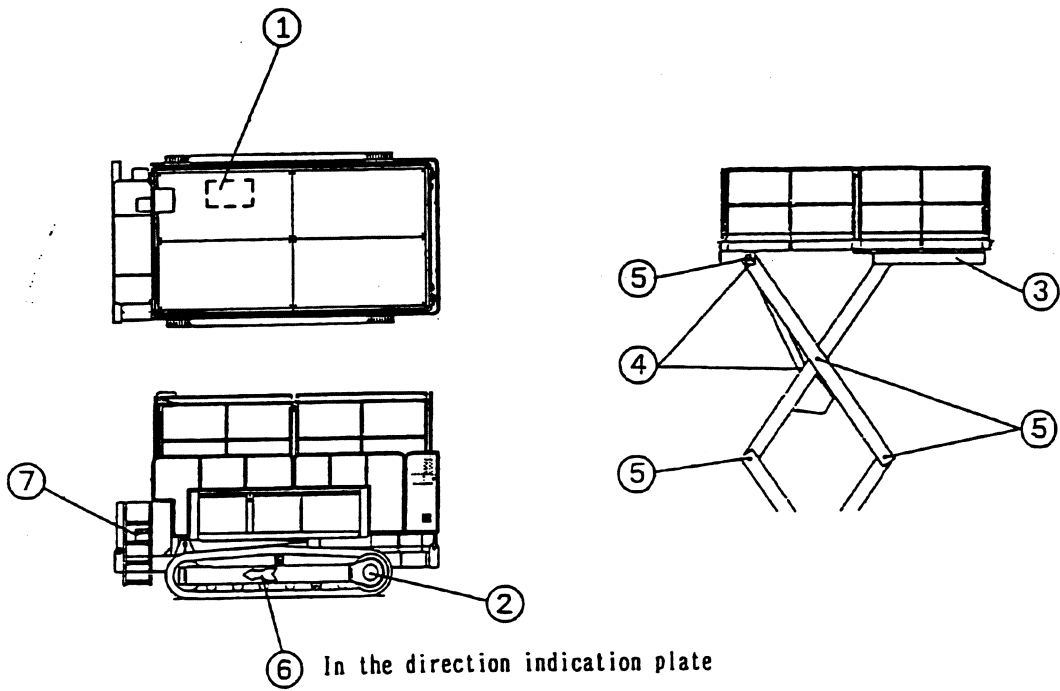
XII. LUBRICATION

1. A list of lubricant

Manufacturers	Hydraulic oil		Gear oil	Grease	
	General purpose	For cold region	Speed reduction gear	General	Gear Compound
Shell oil	Tellus oil 46	Tellus oil T15	Spirax EP 90	Alvania EP grease 2	Cardium compound A or D
Esso oil	Unipower XL46	Univis N46	Standard gear oil 90 Esso gear oil GP80	Lithtan EP2 Beacon EP2 Nidok EP2	JWS 2563 Spartal EP2200
Mobil oil	DTE25		Pegasus gear oil 90 Mobilube GX90	Mobilux EP2	Mobiltac QQ
Nippon oil	Super highland 46	Highland wide 15	Gearlube SP 90	Epiknock AP2	Cranoc compound 1
Idemitsu kosan	Daphne super hydro x46	Daphne super hydro WR15	Apolo gear HE 90	Daphne coronex grease EP No.2	Daphni open gear oil No.1
Cosmo oil	Cosmo hydro HV46		Cosmo gear GL-4 90	Cosmo grease diner Max EP No.2	Cosmo gear compound No.2
Japan energy	Hydrax ES46		Gear 4-90	Resonics grease EP-2	Gear compound No.2
Mitsubishi oil	Diamond long life hydro 46		Diamond hypoid gear oil 90	Diamond multipurpose EP grease 2	Mitsubishi gear compound 2
General oil	Hydfluid AW wide 46		G-gear 4-90	Gemico grease ME-2	General gear compound 2

1.Oil the hinges well with machine oil.

2. Lubrication chart and interval



No.	Item	Lubricant	Lubrication interval		
			30h or 1 week	100h or 1 month	1,200h or 12 months
1	Hydraulic oil tank	Hydraulic oil		△	◎
2	Travel gear box	Gear oil		△	◎
3	Guide rail and rollers	Grease (General)	○		
4	Anchor pins for lift cylinder		○		
5	Pivot pins for scissors arms		○		
6	Grease cylinder for crawler		Refer to XIII-7		
7	Engine	Refer to engine manufacturer's manual.			

△ Oil change for new unit

○ Greasing

◎ Oil change general

XIII. DAILY MAINTENANCE

Because of the various materials used in the construction of this equipment certain parts will deteriorate over time, and therefore require regular replacement. It is important that even if there is no obvious deterioration to a part that it is replaced anyway in the light of safety and performance.

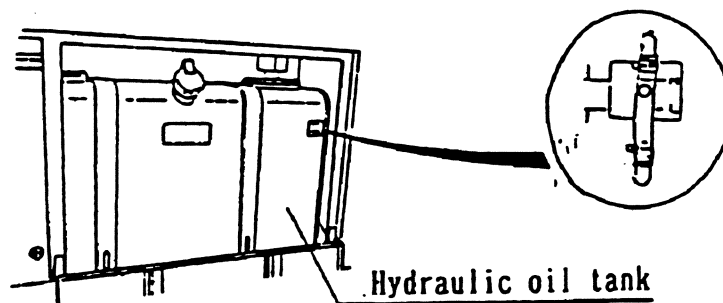
NOTE: Carry out inspection and maintenance work on firm level ground.

DANGER : When you enter underneath the platform for inspection and maintenance, be sure to use safety support. (Ref. X-5)

1. Hydraulic oil

1.1 When replenishing

Check oil level with oil level gauge attached on the side of the tank, and refill to the level indicated through the oil filler cap.



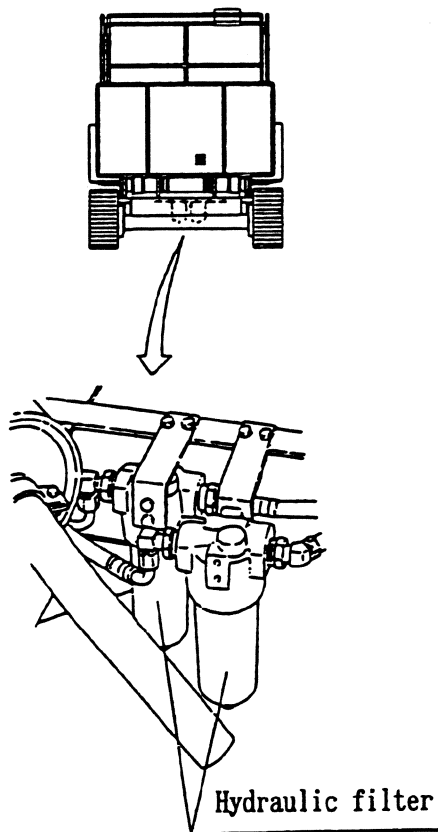
WARNING: Lower platform to its lowest position, when checking hydraulic oil level.

1.2 Hydraulic oil change (once a year)

- (1) Lower platform completely.
- (2) Remove the drain plug installed on the bottom side of the tank and drain hydraulic oil.
- (3) Refill hydraulic oil checking the hydraulic oil level with the oil level gauge.
- (4) Replace hydraulic filters at the same time.

NOTE: Hydraulic oil tank capacity : 250 liters.

NOTE: Contact our authorized service shop for further details.

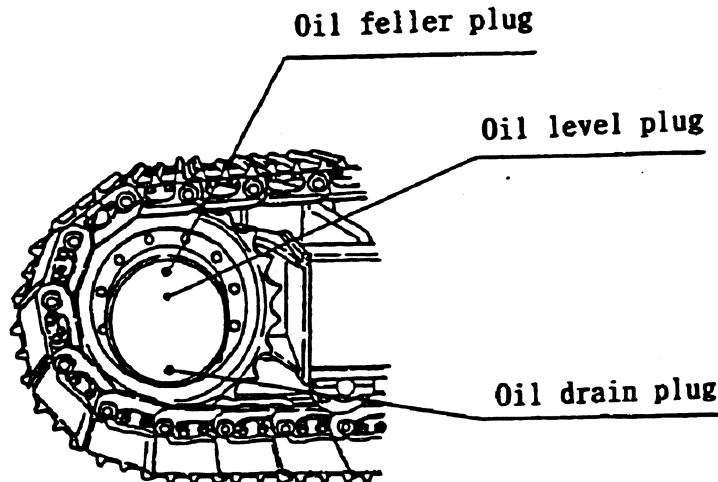


2. Gear oil for "Travel gear box"

Change gear oil as following next steps.

- (1) Set oil filler, level and drain plugs perpendicular to the ground as shown in the figure below.
- (2) Remove all of the plugs and drain the oil thoroughly.
- (3) Install drain plug, and refill gear oil through oil filler port until oil overflows from oil level port.
- (4) Install oil level and filler plugs.

NOTE: Oil capacity : 1.7 liters.

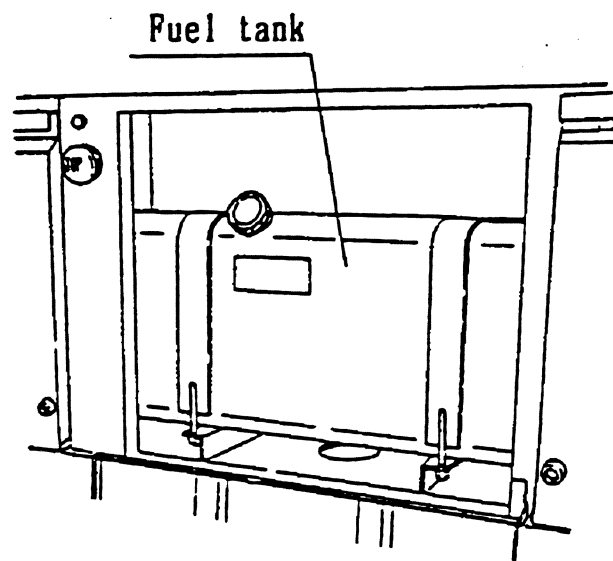


3. Fuel

Use gas oil as fuel.

Check fuel level using level gauge attached on the side of the tank, and refill to the level indicated.

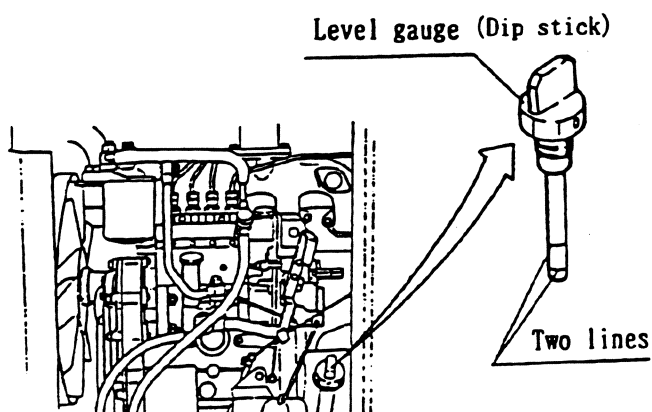
NOTE: Fuel tank capacity : 75 liters.



4. Engine

(1) Engine oil

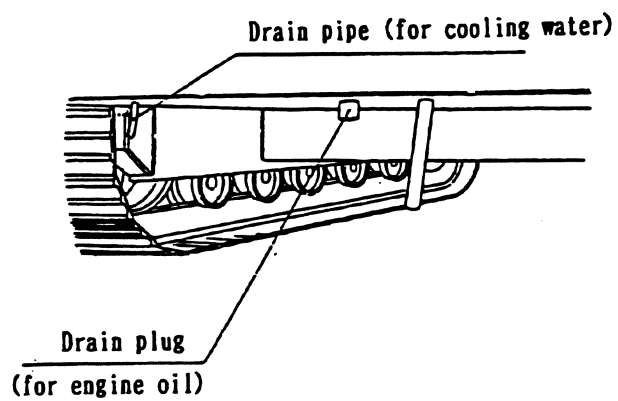
Check oil level with oil level gauge, and refill to level.



NOTE: * Check oil level without screwing in the gauge (dip stick).

* Keep the oil level between two lines on oil level gauge.

NOTE: The engine oil drain plug is located underneath the machine at the front.

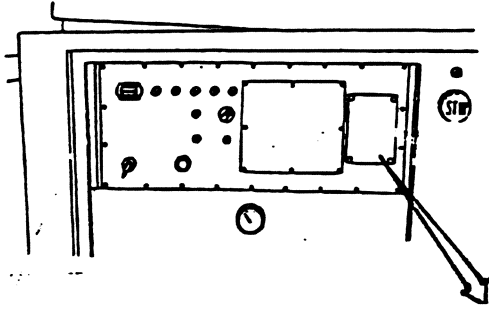


NOTE: The drainage outlet for the cooling water is located on the radiator.

5. Fuses

The fuse box is located on the lower control panel.

If any failures exist, check the fuse and replace if blown.



15A	LOWER CONTROL	VALVE CONTROLLERS	5A
5A	FUEL GAUGE	UPPER CONTROL	10A
3A	HOUR METER	BATTERY RELAY	5A
20A	ACCELERATOR MOTOR	SPARE	
20A	ENGINE STOP SOLENOID	MAIN POWER SUPPLY	30A
FUSE EXTRACT TOOL	SPARE		

WARNING : When replacing fuse, make sure the engine key switch is off.

6. Hydraulic hose

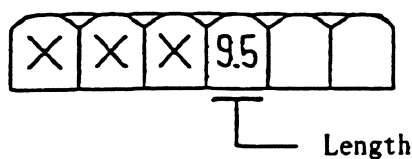
If any cracks, damage, or oil leakage is found on the hydraulic hose, stop using the machine immediately and contact our designated service shop nearest to you.

When ordering parts, please have on hand the following details:

- (1) Classification of hose : rubber or nylon
- (2) Location on the machine
- (3) Length of hydraulic hose: the dimension between the tips of both hose fittings.

NOTE : The length is indicated at "hose fitting" as shown in the figure below.

(Rubber hose only)



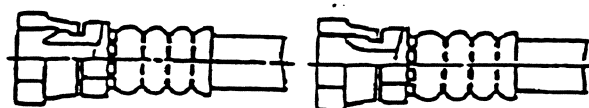
Example : 9.5 → 950 mm

12 → 1,200 mm

- (4) Classification of "Hose fittings"

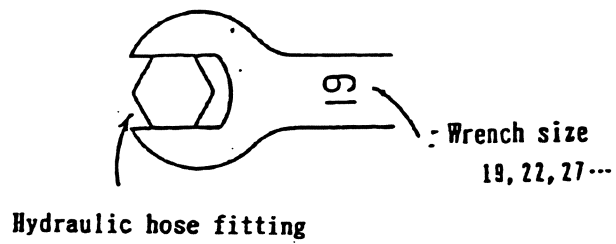
Hose fitting(male)

Hose fitting(female)



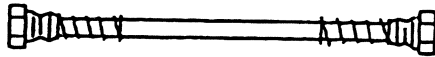
(5) Size of hydraulic hose

Please let us know the correct wrench.

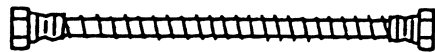


(6) Existence of armour

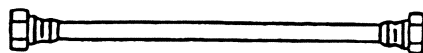
① Both sides armoured



② Completely armoured



③ Non armoured



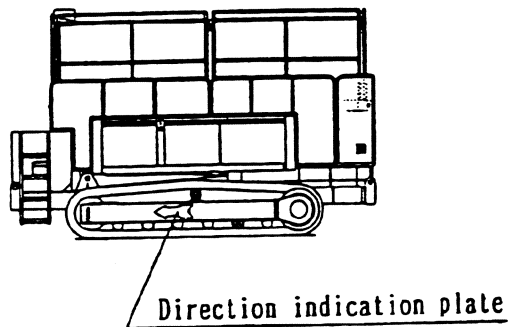
7. Crawler

Sagging may occur on the track due to wear, to combat this, you are requested to adjust the track tension periodically. If the tension is not correct, the track may detach.

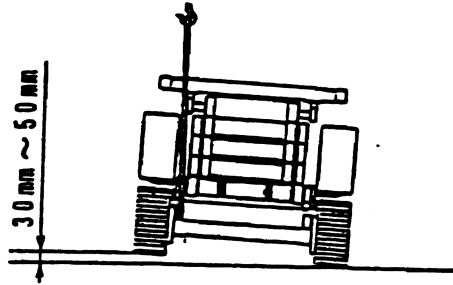
7.1 Adjustment method (reference)

- (1) Remove direction indication plate installed on the side of the machine, and identify the grease fitting for adjusting tension.

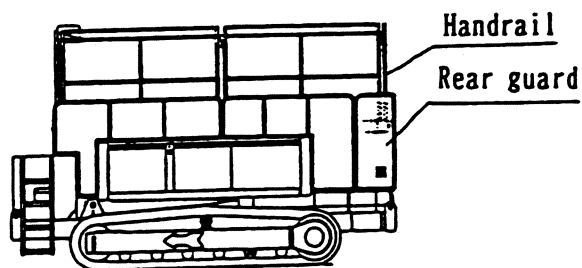
NOTE: Direction indication plates are located on both sides.



- (2) Lift the machine referring to the figure below, to allow a clearance (30 ~ 50 mm) between track shoes and ground.



WARNING: Before lifting the machine, be sure to remove both the handrail and rear guard. If they are not removed, they may be damaged by the sling ropes.

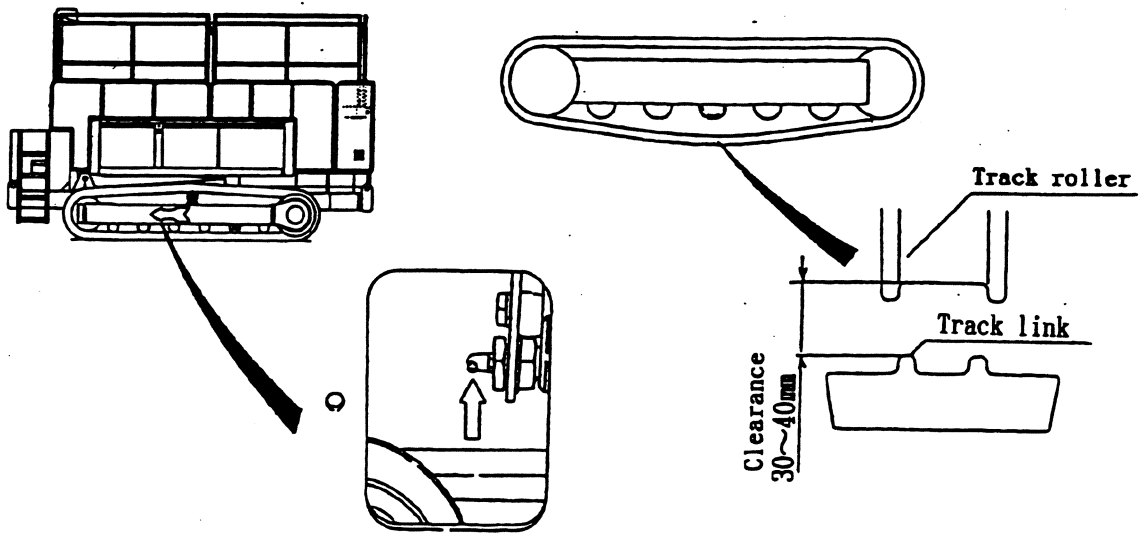


WARNING: Do not lift up the machine excessively, as it causes unnecessary instability.

(3) Apply grease to the "Grease cylinder" through the "Grease fitting" , and adjust the track tension.

Adjust the tension on the central part of track so that the clearance between the track link and the track roller becomes 30 ~ 40 mm.

If the track is too tight, unscrew the "Lubricator" part way until grease exudes to release tension.



(4) After adjusting one side, adjust the other side in the same way.

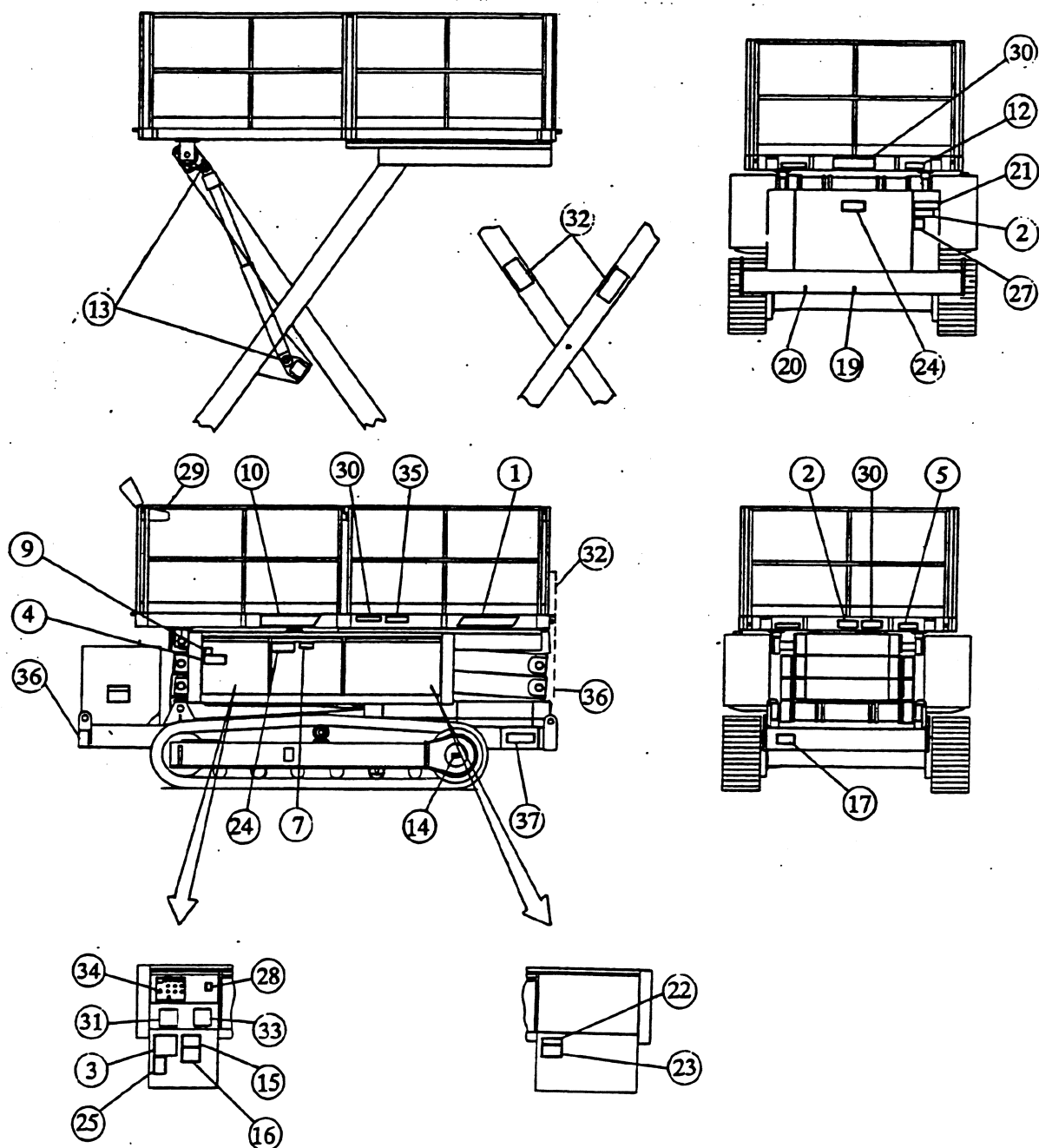
7.2 Adjustment interval

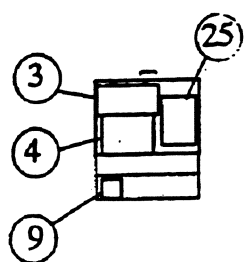
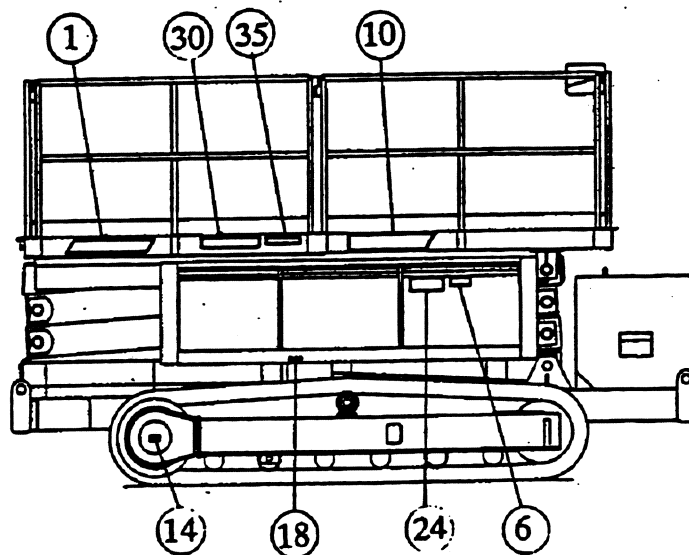
Adjust the track tension at the following intervals.

	Adjustment intervals
First time on new machine	After 10 ~ 20 hours
There After	Every 800 hours

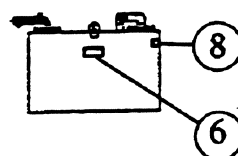
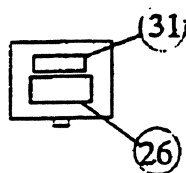
NOTE: To check machine operating time, read the hour meter.

X IV. DECALS

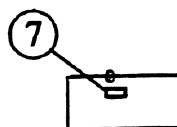




Upper control cover



Hydraulic tank



Fuel tank

No.	Part number	Description	Qty
1	494-03505	Decal, SKYTOWER	2
2	S49321-29(RV093) S49321-30(RV123)	Decal, RV-093 Decal, RV-123	2
3	491-04461	Decal, Precaution, Safty system	2
4	491-04460	Decal, Precaution for working	2
5	494-02929	Decal, REAR	1
6	494-02876	N.P. Hydraulic oil	2
7	494-01936	N.P. Diesel fuel	2
8	494-01582	LEVEL Gauge, Hydraulic	1
9	491-04088	Decal, No wash	2
10	182-01002	Decal, Aichi logo	2
11	340-00132	Rivet	6
12	494-02928	Decal, FRONT	1
13	494-01535	Decal, Grease (RV093) (RV123)	22 28
14	494-01497	N.P. Gear oil	2
15	V12-Y6022	Decal, Emergency descent	1
16	V09-Y6036	Decal, Hoisting procedures	1
17	V09-Y6037	Decal, Overall weight	1
18	494-02926	N.P. Emergency lowering valve	1
19	494-04399	N.P. Engine oil drain plug	1
20	494-04400	N.P. Cooling water drain plug	1
21	S49320-11	Decal, SKYTOWER	1
22	491-01234	Decal, Battery cable	1
23	491-01237	Decal, Battery liquid	1
24	V12-Y6021	Decal, No load allowed...	3
25	491-04459	Decal, Engine operation	2
26	491-04649	Decal, Electrocution Hazard	1
27	494-04720	Decal, CE mark	1
28	494-04719	N.P. Fuse	1
29	V09-Y6038	N.P. Upper control panel	1
30	494-04729(RV093) 494-04730(RV123)	Decal, Rated load	4
31	491-04638	Decal, Caution on operation	2
32	491-04688	Decal, Do not enter	5
33	V09-Y6041	Decal, Ground contact pressure	1
34	V09-Y6040	N.P. Lower control panel	1
35	494-04433	Decal, Manual load, wind speed	2
36	494-04735	Stripes, Warning	6
37	493-04675	N.P. Serial number	1