Foreword

In this Operating Manual, the operation, repair, lubrication, maintenance, adjustment and troubleshooting of NT18 hydraulic excavator are introduced so as to provide its operators with basic knowledge for efficient, economical and proper operating of the excavator.

Before operating the excavator, operators must read this Manual carefully and completely so as to guarantee correct and standardized operation. This manual will offer you step-by-step guidance on everyday safety routines.

The Manual only provides you with basic knowledge, operators, however, have to enhance their skills and proficiency and become familiar with the performance of the excavator through practice and experience. It is of utmost importance that every care is taken to ensure safety.

In this Manual, matters concerning safety will be emphasized by “!” and matters concerning techniques by “★”.

We are working hard to improve our products , and increase their efficiency by continually improvement. Therefore, illustration may include optional equipment. Nante products and specifications are subject to improvements and changes without notice.

Please keep this Manual within easy access in the cab for convenience of use.

NT18 is the excavator with cab.

NT18A is the excavator without canopy

Nante Excavator Factory
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Contents

Chapter 1 Structure and Performance

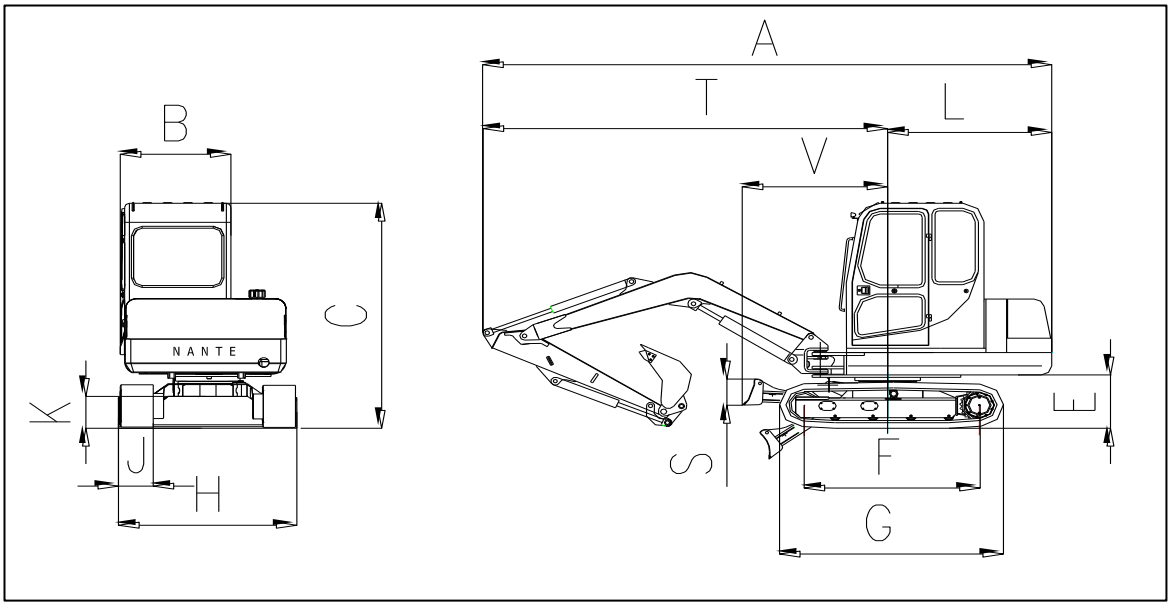
Section 1: General Configuration and Technical Specifications

Type	NT16 or NT18	Technical specifications	
Weight	1700kg/ 1750kg	Traveling speed	0~4.5 km/h
Bucket capacity	0.05~0.07 m3	Swing speed	0~12 rpm
Engine	可选	Gradeability	35°
1. Type	3TNV82A-SNN（Yanmar）	Max. digging force	11 kN

Rated power	15.5kW	**Pressure to the ground**	30kPa
Max. torque	80.7~87.8N • m/1320±100rpm	**Hydraulic system**	
Rated revolution speed	2200 r/min	**Pump type**	**Gear Pump**
2. Type	LL380B(Laidong)	**Setting Pressure**	180kg.f/cm2
Rated power	**15.5kW**	**Displacement P1, P2, P3**	**（10+10+3）or（10+10）or （8+8+8）ml/r**
Max. torque	**71 N • m/1680rpm**	**Swing motor**	**Axial piston motor + Reduction or orbital motor +Reduction**
Rated revolution speed	**2400 rpm**	**Travel motor**	**Axial piston motor + Reduction or orbital motor +Reduction**

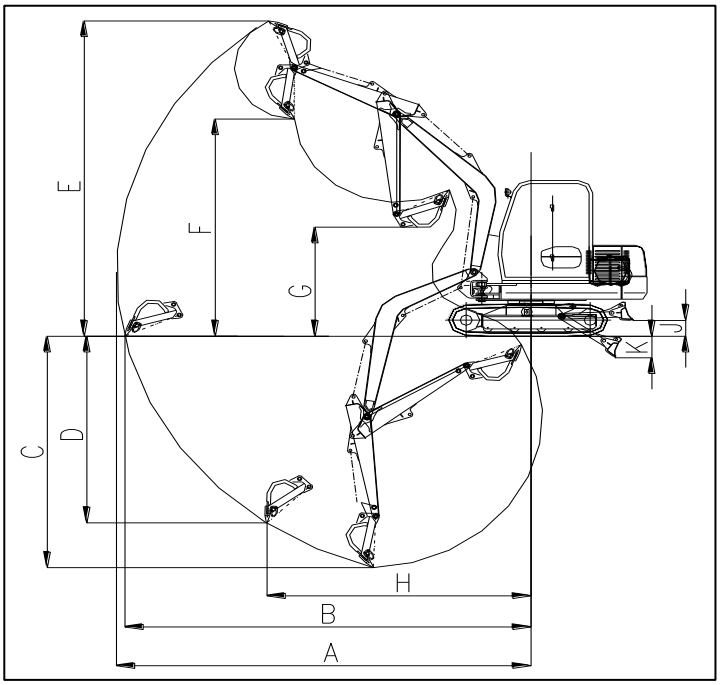
A	**Bucket**	**H**	**Plateform**
B	**Bucket Cylinder**	**I**	**Crawler**
C	**Arm**	**J**	**Sprocket**
D	**Arm Cylinder**	**K**	**Dozer**
E	**Boom**	**L**	**Track**
F	**Boom Cylinder**	**M**	**Idler Roller**
G	**Cab**	**N**	**Dozer Cylinder**

Section 2: Overall Dimensions



A	**3800mm**
B	**1050mm**
C	**2300mm**
E	**465mm**
F	**1090mm**
G	**1460mm**
H	**1050mm**
J	**230mm**
K	**235mm**
L	**1160mm**
S	**260mm**
T	**2640mm**
V	**920mm**

Section 3: Working Range



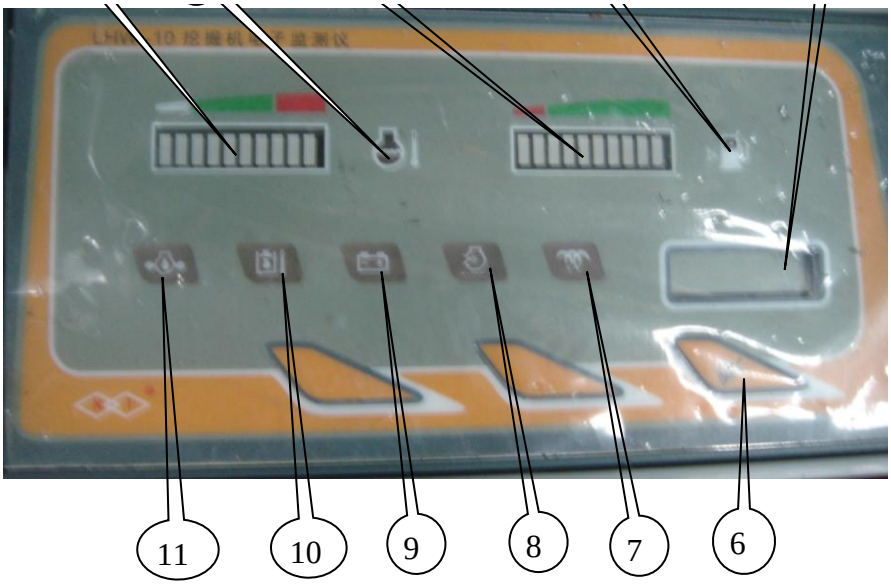
No.	Description	Dimensions (mm)	Remarks
A	**Max. digging radius**	3715	
B	**Max. digging reach at ground level**	3610	
C	**Max. digging depth**	2065	
D	**Max. vertical digging depth**	1500	
E	**Max. digging height**	3025	
F	**Max. dump height**	2220	
G	**Min. dump height**	1250	
H	**Max. vertical wall**	3180	
J	**Max. dozer blade lift height**	200	
K	**Max. dozer blade down depth**	245	

Chapter 2 Instruments, Switches and its Functions

Section 1 Instruments and Switches on Electronic Monitor

The electronic Monitor includes indication lamps, meters and switches, as shown in the picture below.

1.Cooling water temp.alarm Lamp



2.Cooling water temp.indicator
3.Fuel level indicator
4.Fuel level alarm lamp
5.Wording counter
6.muting switch
7.Warm-up indicator
8.Air-in resistance indicator
9.Chorging indicator
10.Hydraulic oil temp.indicator
11.Engine oil pressure indicator

SWITHES FUNCTIONS AS FOLLOWINGS:

1.Front working lamp switch
2.Boom working lamp switch
3.High or low speed switch
4.Fan switch
5.Wiper switch
6.Heater switch
7.Behind working lamp switch
8.Alarm lamp switch

1. Functional check of Monitoring system

Before starting the engine, as the starting switch is turned to ON, the display screen will light up. If it fails to do so after the buzzer has rung for three seconds, it indicates that some circuits are open in the monitor and it must be sent for repair or replacement immediately.

2. Indication and alarm functions

A. Cooling water temperature indication and alarm: Item 1 is cooling water temperature indication lamp. The illumination of green zone means normal water temperature. The red zone indicates that the water temperature is too high. When the alarm lamp (ITEM 2) flashes and the monitor sends off both audio and light alarms, stop the engine or slow down the engine to idle speed immediately and check the cooling water level in the

B. Diesel engine low oil pressure alarm: Item 11 is an alarm lamp for engine oil pressure. As the engine is started, this lamp flashes. While the engine is running, the lamp remains unlit to indicate a normal engine oil pressure. If the pressure is too low, it flashes. Refill engine oil immediately.

C. Fuel level indication: Item 3 is a fuel level indicator. During operation, the illumination of green zone indicates normal fuel level. However, when fuel in the tank runs low, its red zone lights up, the fuel level alarm lamp (Item 4) flashes, and the monitor issues both audio and light alarms. Stop the engine immediately and check and refill fuel.

D. Charging indication: Item 9 is a charging indication lamp that illuminates when the generator operates normally. When the operation of the generator is abnormal, the lamp goes off, indicating that the generator is not charging, and the operation of the generator must be checked immediately.

E. Working counter (Item 5): It is used to indicate the number of hours that the excavator has operated. When the generator starts running, the meter begins to time.

F. Muting switch (1): It is used to switch on and off the buzzer. During the operation of the engine, if the buzzer sounds an alarm, this switch can be used to mute the buzzer.

3. Switches

A. Working Lamp switch (1): It is used to turn on and off lights for excavator.

B. High and low speed switch (3): It is used to control the high and low traveling speed for track drive. Pressing the switch changes the excavator to high speed.

★ The excavator must be stopped before changing the speed. The interval between any continuously speed changing must be equal to or longer than 1 second, or the electromagnetic control valve might be damaged.

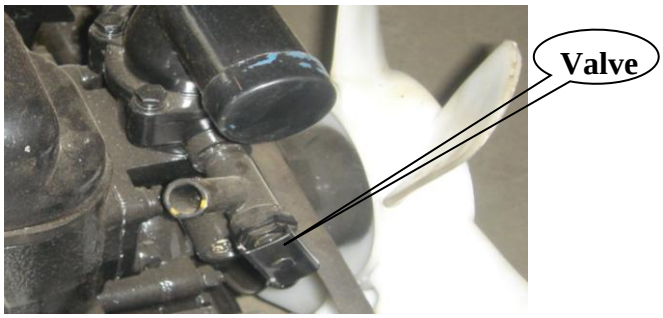
C. Wiper switch (5): It is used to turn on and off the wiper.

D. Heater switch (6): It is used to open and close the heater.

★ The operator uses hot water in the engine to get heat. When warm air is required, please open the hot water valve (Valve 1 shown in following picture). If warm air is not needed for a long time, please close this valve 1.

E.Boom working lamp switch(2): It is used to turn on and off lights for excavator.

F.Fan switch(4):It is used to on or off the fan.



Section 2: Control Switches, Levers and Fuse Boxes

A. Start switch (as shown in the figure below): It is a keyhole located on the rear side of the right control box and used to start the engine. The switch has the following positions:

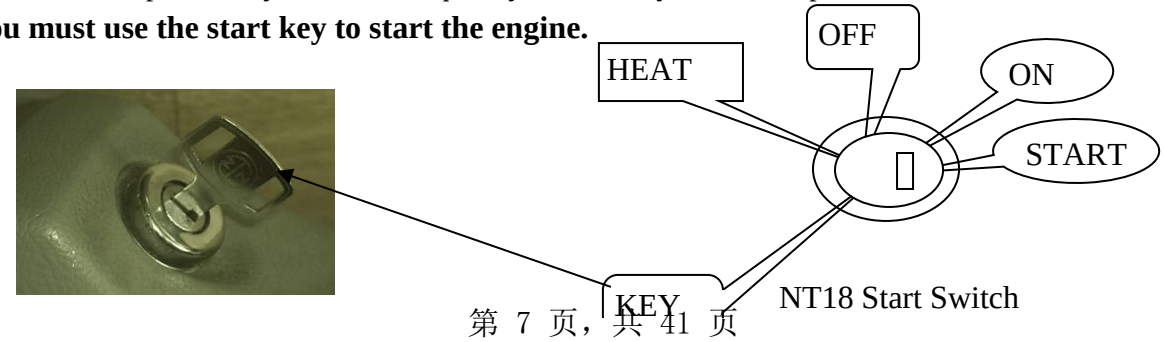
OFF The position at which the key can be inserted and pulled out. At this position, the starting circuit is disconnected.

ON The charging and starting circuit is connected. After the engine is started, keep the key at this position.

START To start the engine at this position. Release the key once the engine is started.

HEAT Start the engine at this position at low temperature. Turn the key to this position, and release it, which will return to OFF position by itself. Then, quickly turn the key to START position.

★ You must use the start key to start the engine.



NT18 Start Switch

B. Horn button (see the picture below)

With this button depressed, horn begins hooting.

C. Cab light switch (located at upper right position inside the cab, see the picture below)

With the switch set at left position, the cab light comes on.

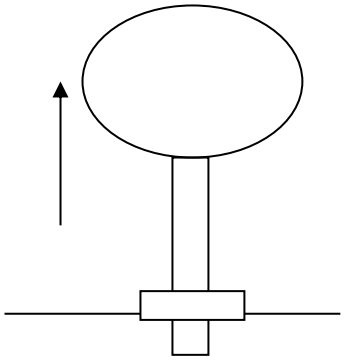
D. Shutdown switch

With the switch set at OFF position, the diesel engine shuts down automatically.

★: There is a manual shutdown device at the rear side of the control box. In case the engine does not shut down automatically after the shutdown switch is set at OFF position, the driver can pull up the manual shutdown rope to shut down the engine manually. (See the picture

Horn button

Cab light switch



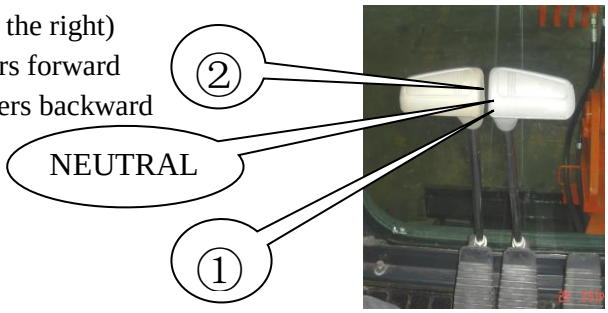
Shutdown switch

E. Throttle lever

The lever is located on the right side inner cab and used to control the revolution speed and output power of the engine.

F. Traveling control levers (see the picture on the right)

①	Forward: Push both levers forward
②	Backward: Push both levers backward
N	Neutral: Travel stops



G. Left joystick (Bucket arm and swing control lever)

(see the picture on the right.For details, refer to Page 14, Control of working devices)

N	Neutral position
1	Arm extends
5	Arm retracts
3	Plateform turns right
7	Plateform turns left

The joystick will return to neutral position after it is released.

H. Right joystick

(For details, refer to Page 14, Control of working devices)

N	Neutral position
5	Boom lifts
1	Boom lowers
3	Bucket dumps
7	Bucket turns up

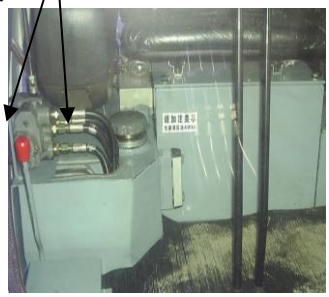
I. Dozer blade control lever(For details, refer to Page 14, Control of working devices)

Forward Dozer blade down

Backward Dozer blade up

J. Hammer control Pedal

The right pedal in the cab is used for hammer control (see the picture on the right). When the excavator is equipped with a hammer, just step on the front of this pedal and the rock-break function can be realized.



K. Boom swing control switch

The boom-swing control switch is a red lever located at the front right position in the cab. When boom-swing operation is required, lower this lever while operating the swing.

★: There is another kind of design to control Boom-swing.When boom-swing operation is required, press the button on the top of the left joystick while operating the swing

L. Locking switch (see the picture on the right)

Lift the left control box up to lock the pilot system

Level the left control box to unlock the pilot system.

! When the excavator is parked or when you leave the excavator, you must lower the bucket on the ground and lift up the left control box to the locked position.

★ This is a hydraulic lock. Even if the lock is on, the right joystick, left joystick,dozer blade control lever and travel control lever can still be moved, however, the excavator would not

M. There is a button on the left sidewall of the cab (see the picture below). The door is locked automatically when opened, as this will reduce vibration of the door during operation. The door can be opened and closed by depressing this button.

N. Fuses are used to protect electrical units against burnout. Fuses must be replaced if they are found corroded or loosened, or having white powder on their surface.

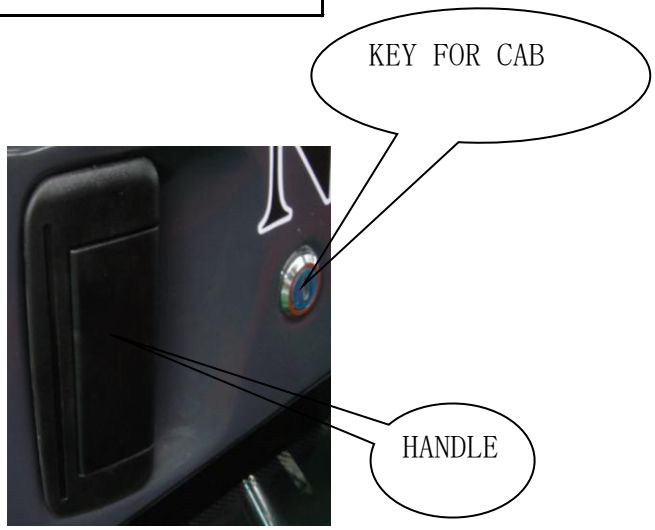
★ The replacement fuse must be of the same specifications as the fuse to be replaced.

★ The start witch must be turned off when replace any fuse.

The configurations and specifications of the fuses are given in the table below:

Air-condition/left box	30A
Horn/swing	20A

Working lamp	30A
Safety lock	20A
Start switch	30A
Intermediate relay	10A
Wiper/heater/alarm	20A
High/Low speed/Fan	



Chapter 3 Operation

Section 1 Pre-start Check

Pre-start check is a preliminary measure to prevent the occurrence of troubles after starting. As such, it should not be ignored.

A. Walk-around inspection: Check the side surfaces and bottom side of the excavator for any loose bolts and nuts, excessive dust, and leakage of fuel, oil and water; check the working device and hydraulic system for normal conditions; and check all electric cables for looseness and excessive dust.

1. Check and make sure that the seals of the high-pressure hoses, high-pressure connectors and hydraulic cylinders are free from leakage.
2. Check and make sure that the idler rollers are tight.
3. Check and make sure that the connector of the battery is securely connected.
4. Check and make sure that the radiator is free from leakage.
5. Check and make sure that there is no fuel, oil or water leakage around the engine.
6. Check and make sure that the bolt of the air filter is securely fitted.

B. Check and make sure that the diesel oil tank is enough. If not, refill the diesel oil.

C. Check and make sure that the hydraulic oil tank is enough. If not, refill the hydraulic oil.

D. Check the level of engine oil: Open the rear cover of the excavator and check the oil stick . Refill with oil through the filling port if necessary.

E. Check and make sure that all control levers are at neutral positions.

F. Check and make sure that the hydraulic locks are in locked position.

G. Check and make sure that the radiator tank is full.

Section 2 Starting the Engine

Start the engine only after all preliminary checks are made and safety within the swing range has been confirmed.

A. Pull the throttle lever to the position 1/3 of the total travel of the lever.

B. Insert the key into the starting switch, rotate it clockwise to the starting position to start the engine. The key must not be kept at this position for longer than 10 seconds. When the engine is started, the key will return to this position automatically when released it.

C. If the engine fails to start, restart can be made after 1 minute.

Section 3 After-Start Check

After the engine is started, do not operate the excavator before the following operations and checks are completed:

A. Adjust the throttle lever to allow the engine to run at the middle speed for 5 minutes at no load.

B. Turn on the hydraulic lock switch, slowly operate the working device: Operate the bucket and arm to the end of their travel. Repeat the operation for approximately 5 minutes to increase hydraulic oil temperature.

C. Check and make sure that all indication and alarm lamps are normal.

D. Check if the exhaust gas is normal in color and if there is any abnormal noise or vibration.

★ When the temperature of the hydraulic oil is below 20℃, do not operate various levers abruptly.

★ The normal temperature range of the hydraulic oil is 50 ~ 80℃. However, in order to prolong the life of the excavator, the temperature of the hydraulic oil must be increased at least to 20℃ before operation.

★ When retracting the working device, be careful not to let it collide with the track frame of the excavator or the ground.

★Do not run the engine at low or high revolution speed for more than 20 minutes.

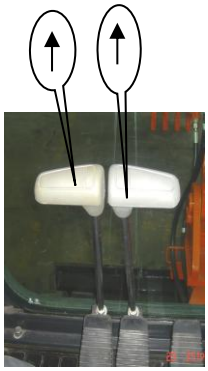
Section 4 Operating

A. Before operating the excavator, make sure that the surroundings are safe and sound the horn.

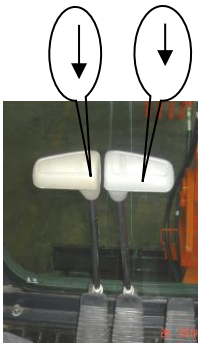
B. Pull back the throttle lever to increase the revolution speed of the engine.

C. Operate the working device and lift it to about 40 ~ 50mm above the ground.

D. Operate the left and right traveling , start to drive the excavator.



（move forward）



（move backward）

1. Push forward the left and right control levers, the excavator will move forward; and pull back the control levers, the excavator will move backward. (See the picture on the right)

2. Stop the excavator and make a turn.

Push forward the right control lever, the excavator will turn left; and pull it backward, the excavator will turn right.

Push forward the left control lever, the excavator will turn right; and pull it backward, the excavator will turn left.

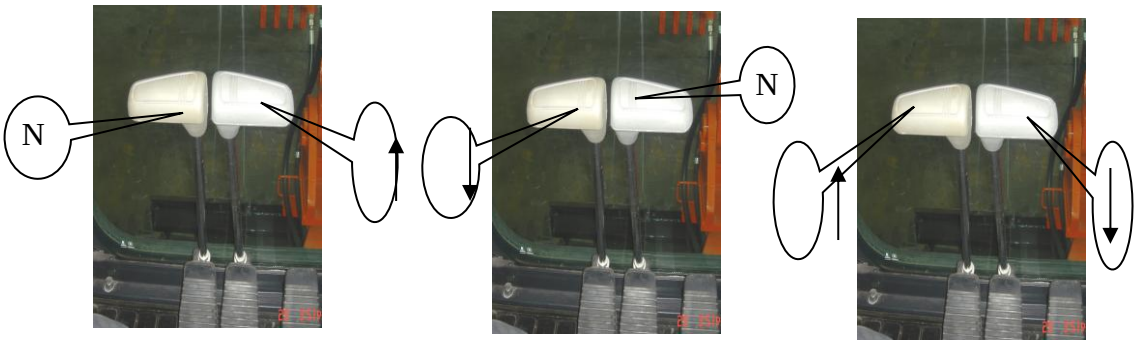
3. Making left turn while traveling: with left travel control lever set at neutral position, push forward the right travel control lever, the excavator will turn left while moving forward; and pull backward the right travel control lever, the excavator will turn left while moving backward. (See the picture below).

4. Making right turn while traveling: with right travel control lever set at neutral position, push forward the left travel control lever, the excavator will turn right while moving forward; and pull backward the left travel control lever, the excavator will turn right while moving backward. (See the picture below).

5. Making pivot turn: Pivot turn is made by moving both left and right control levers in opposite directions. To pull the left control lever backward and push the right control lever forward at the same time, the excavator will turn left; and to pull the right control lever backward and push the left control lever forward at the same time, the excavator will turn right. (See the picture below).

★ Caution: Before operating the traveling control levers, be sure to check if the track frame faces forward or rearward. When the excavator swings 180° (i.e. the idler roller and the boom

are located in opposite directions), the operating direction of both control levers will be



（Turn left while moving forward） (Turn right while moving backward) (Right turn)

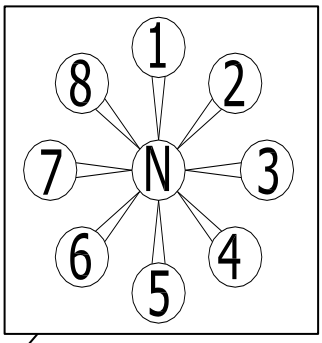
E. Bulldozer control

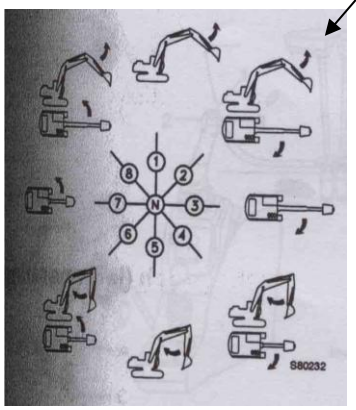
Use the bulldozing control lever to operate the bulldozer up or down.

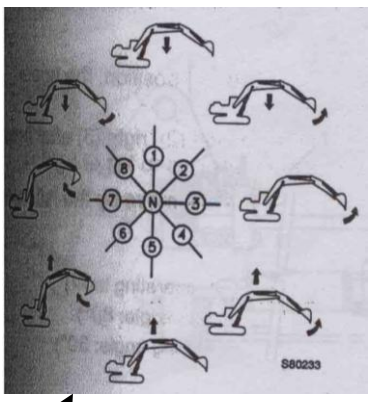
F. Control of working device

Use the left and the right joysticks to operate the swing drive, boom, arm and bucket, so as to accomplish the operations of digging, leveling, loading and unloading, lifting, etc.

The movement of the joysticks and the working device is as shown in the picture below: When released, the control levers will return to their neutral positions automatically and the working device stop.





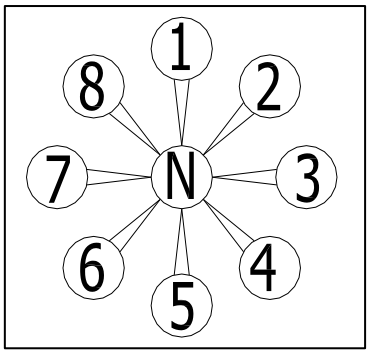


Left joystick

N Neutral position
1 Arm extends
2 Arm extends and turns right
3 Platform turns right
4 Arm retracts and turns right
5 Arm retracts
6 Arm retracts and turns left
7 Platform turns left
8 Platform extends and turns left

Right joystick

N Neutral position
1 Boom lowers



2 Boom lowers, bucket dumps
3 Bucket dumps
4 Boom lifts, bucket dumps
5 Boom lifts
6 Boom lifts, bucket turns up
7 Bucket turns up
8 Boom lowers, bucket turns up

Section 5 Parking

Do not shutdown the excavator abruptly. Appropriate space must be considered around the excavator when parking.

1. Set both left and right traveling control levers at neutral positions.

2. Push the throttle to reduce the revolution speed of the engine.

3. Lower the bucket horizontally until its bottom touches the ground.

4. Lift the left control box and set the hydraulic lock.

Caution ! Choose a level and hard ground surface to park the excavator after the digging operation is completed. If the excavator has to be parked on a slope, insert chocks into its tracks and dig the bucket into earth if possible.

Section 6 Shutdown the Engine

Cool down the engine before shutdown.

1. Let the engine run at a low speed for 5 minutes to cool the engine.

2. Pull up the shutdown rope to shutdown the engine (For Laidong diesel engine LL380B).

3. Turn the starting key to OFF position and remove the key(For Yanmar diesel engine 3TNV82A-SNN

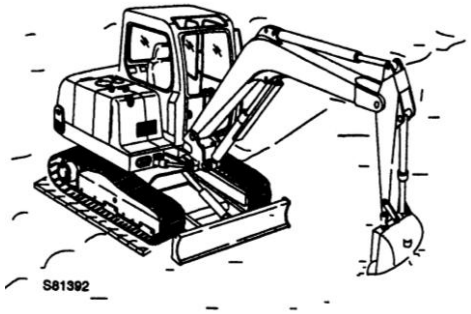
4. Check the engine and close the cab door.

★ To shutdown the engine without cooling would shorten the life of the engine. Therefore, unless in emergencies, do not shutdown the engine abruptly.

★ Especially when the engine is overheated, it must be cooled at middle speed before shutdown.

Section 7 Cautions in operating

1. Cautions in operating



A. When operating the boom, take care to prevent it from knocking on any hard things.

B. When swinging the boom, do not let the bucket dig into earth.

C. When the bucket is stopped in earth, do not drive the excavator or start digging.

D. During operation, do not let the cylinder extend to its extreme position. A certain allowance should

E. Do not use the bucket as an axe, rock-breaker or pile.

F. Do not use dropping force for bucket to complete digging.

G. When digging hard stone, it is better to use the hammer to break it. In this way, the life of the excavator can be prolonged and the efficiency of operation increased as well.

The following phenomena are normal.

A. The arm may stop for a while when it is retracted close to a vertical position.

B. The arm may stop sometimes when the bucket tooth approaches a horizontal position.

C. Noise can sometimes be heard from the braking valve when the swing operation begins or stops.

D. Noise can sometimes be heard from the travel motor when the excavator travels down slope.

! If it is necessary to operate the working device while the excavator is traveling, the traveling should be stopped before operating.

2. Cautions in traveling

As the excavator (its track frame) may suffer heavy vibration when it overruns obstacles such as gravel and stubs, the operator must slow down the excavator and allow the center of the track to overrun the obstacle.

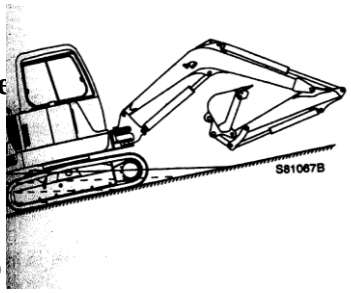
3 .Cautions in traveling through water-covered ground

A、Do not operate excavator into water deeper than the centerline of the upper roller. Parts immersed in water for a long time must be properly lubricated until the old grease is forced out of the bearings (near the bucket pins).

B、 Be careful with the angle of the excavator when it is driven out of water. If the angle of inclination is greater than 15°, the platform would be immersed in water and the radiator fan might be damaged as its blades hit water.

4、Cautions in climbing and descending a slope

(1) When descending a slope, use the traveling control levers and the throttle lever to adjust the speed. If the gradient of the slope is greater than 15°, the operator must first adjust the excavator to the attitude as shown in the picture below and then reduce the revolution speed of the engine.



A! Do not operate the excavator on a slope with a gradient greater than 30°, or the excavator might roll over.

B! During traveling, the bucket should be raised 20~30cm above the ground.

C! It is dangerous to turn and travel on a slope. Drive and turn the excavator on level surface whenever possible.

D! When overrunning an obstacle, keep the working device close to the ground surface and drive the excavator slowly.

E! In case the excavator slips or becomes unstable, lower the bucket immediately and apply the brake.

F! The risk of losing balance or rolling over is very high when making turns or operating the working device on a slope, especially when the bucket is fully loaded. Therefore, such operation should be avoided as much as possible.

G! If work must be done on a slope, you may use earth to pile a level surface and let the excavator operate on this area.

(2) Braking while descending a slope
If you want to brake the excavator when descending a slope, you can set traveling control levers in neutral position.

(3) If the track shoes slip or the travel motor disengages when climbing a slope, you can use the bucket arm to assist climbing.

(4) If the engine be shutdown on a slope, set the traveling control levers at neutral positions first, and then turn the starting key to START position.

5. Cautions in special work

A. If the excavator is working in water and the bucket pin comes in contact with water, the bucket pin must be greased after each work shift.

B. The pins of the working device must be lubricated before each deep digging and heavy-duty operation.

★ After each lubrication, operate the arm, the boom and the bucket several cycles, and then grease again.

6. Cautions while driving through mud

1. Take care to prevent the excavator from immersing in the mud. If the excavator is immersed in the mud, the following method can be adopted to drive it out.

If one side of the excavator is immersed in the mud, you can use the bucket to lift this side up, and put wood under the track and then drive the excavator out of the mud. If possible, put wood under the bucket too.

★ When the boom and the arm are used to lift the excavator, the bucket bottom must be propped against the ground. (Do not use the bucket tooth against the ground). The boom and the bucket arm should be kept at an angle of 90~110°. The same method should be used when dumping the bucket.

2. When both sides of the excavator are immersed in the mud, put wood under the tracks on both sides, dig the bucket into earth in the front of the excavator, then pull the bucket just as normal digging operation, and finally, set the traveling control levers to the drive forward position and drive the excavator out of the mud.

7. Cautions in dragging the excavator

If the excavator is immersed in the mud and unable to get out by its own power, use the steel cable to connect its each track frame to pull the excavator out of the mud.

★ Do not use hook and eye for connection.

Section 8 Replacement of the Bucket

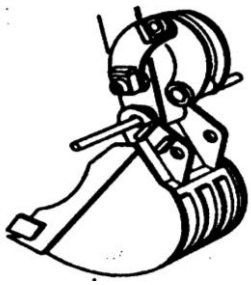
Park the excavator on a hard and level surface. When several persons do the job together, be sure to give clear signals and cooperate well so as to guarantee a safe operation. See the picture below.

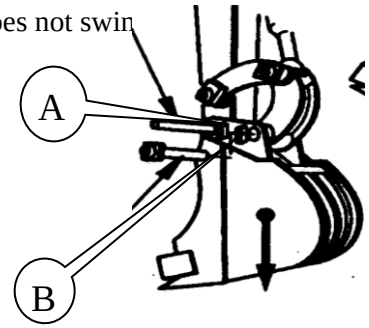
1. Choose a piece of level ground and set the bucket stably.

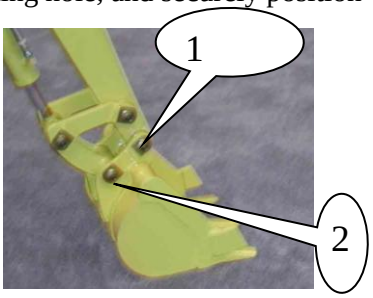
2. Remove the fixing bolt and nut and pull out the pins A and B.

★ After the pins are removed, keep the bucket pins free from mud and sand, and be careful not to damage the seals at both ends of each pin.

3. After the bucket is turned over, adjust well the angle and direction of the fitting hole, and securely position the bucket, ensuring that the bucket does not swin







4. Connect the arm to hole No. 1 with pin A, and then connect the bucket to hole No. 2 with pin B.

5. After fixing the bolts and nuts of the pins properly , we should grease the pins.

★ When replacing the bucket, the clearance between the bucket and arm must be adjusted properly.

Chapter 4 Operating of a new Excavator

If a new excavator is put into overloaded operation right away, its performance will deteriorate quickly and its service life will be shortened. In the first 100 working hours of the new excavator, operate it with special care so as to run in various parts. During run-in time, the following precautions must be taken.

After starting, let the engine run at idle speed for 5 minutes, so as to give enough time for the temperature to rise before working.

Heavy load and high-speed operation should be avoided.

Do not make rush start, acceleration, unnecessary emergency brake, steep turn, etc.

If there is no water in the radiator of the new excavator, flush the radiator with large of clean water first, and then fill the radiator with cooling water.

During the first 100 working-hour period, the shafts of the working device must be greased before operating in everyday.

During the first 250 working-hour period, the following maintenance should be carried out.

A. Check and adjust the valve clearance of the engine.

B. Replace the fuel filter .

★ If the engine oil filter is very dirty, please check the cause before starting and running the engine.

★ The working time will be indicated by the hourmeter.

Chapter 5 Maintenance and Lubrication

Section 1 Regular and Periodical Check and Maintenance List

Proper lubrication and maintenance will guarantee good operation, prolong the service life and reduce the wear of the excavator.

No	Item	Maintenance Content
Pre-start Inspection		
a	Walk around the excavator and check if there is anything abnormal	
b	Cooling water	Check its level and refill
c	Engine oil in sump	Check its level and refill
d	Fuel	
e	Hydraulic tank	Check and refill
f	Electric circuit	Check
Every 100-hour Maintenance		
a	Oil in swing drive case	Check and refill
b	Fuel tank	Drain water and sediment
c	Lubrication	
1	Shaft ,on boom cylinder piston side	1 lubricating point
2	Shaft, on boom rear side	1 lubricating point
3	Shaft ,on boom cylinder rod side	1 lubricating point
4	Shaft ,on arm cylinder piston	1 lubricating point
5	Boom/ arm connecting shaft	1 lubricating point
6	Shaft, on arm cylinder rod side	1 lubricating point
7	Shaft on bucket cylinder piston side	1 lubricating point
8	Arm/connecting rod connecting shaft	1 lubricating point
9	Bucket / arm connecting shaft	1 lubricating point
10	Connecting rod connecting shaft	2 lubricating point
11	Shaft ,on bucket cylinder rod	1 lubricating point
12	Bucket/connecting rod connecting shaft	1 lubricating point
First 250-hour Maintenance		
a	Fuel filter	Replace filter
b	Engine valve clearance	Check and adjust
Every 250-hour Maintenance		
No	Item	Maintenance Content
a	Final driving box	Check and refill
b	Engine oil sump and oil filter	Replace oil and filter
c	Fan belt	Check tightness
d	Hydraulic oil filter	Replace filter
e	Swing ring	3 lubricating points
f	Battery	Add distilled water every 2-3 months

Every 500-hour Maintenance		
a	Pinion shaft gear of swing drive	Lubricate with grease
b	Radiator and hydraulic oil cooler	Clean

c	Fuel filter	Replace filter
Every 1000-hour Maintenance		
a	Swing drive case	Replace engine oil
Every 2000-hour Maintenance		
a	Hydraulic oil tank	Replace engine oil
b	Inlet filter for hydraulic oil	Clean
c	Final driving box	Replace engine oil
d	DC generator and starter motor	Check
e	Shock absorber for engine	Check
f	Engine valve clearance	Check and Adjust
Every 4000-hour Maintenance		
a	Water pump of engine	Check
When necessary		
a	Cooling system	Clean
b	Air filter	Check and clean or replace
c	Track	Check and adjust its tightness
d	Track shoe bolt	Check and tighten
e	Bucket tooth	Replace

Section 2 Unscheduled Maintenance

1. Clean the internal of the cooling system, replace the cooling fluid, add antifreeze agent or replace the anticorrosion unit as per Table below.

Type of cooling	Clean cooling system or replace cooling fluid
Permanent anti-freezing	Every year or 2000 hours (whichever occurs first)
Non-permanent (contains glycol)	Every 6 months (in spring and autumn)
No antifreeze is used	Every 6 months or 1000 hours (whichever occurs first)

★ Use city tap water as cooling water. If river water or other water is to be used, it must be treated first.

★ The antifreeze is combustible and must be kept away from fire.

★ When adding antifreeze into cooling water, it is recommended to use a densimeter to control the concentration of the mixture.

2. Clean filter

A. Use compressed air. Blow the filter from inside to outside and from outside to inside repeatedly with dry compressed air at a pressure lower than 7kg/cm2, and check it.

★ When compressed air is used, the operator must wear goggles or other protective apparatus.

★ If there are wrinkles on the filter or any washer or seal is damaged, the filter must be replaced.

B. Use water. Flush the filter from inside to outside and from outside to inside repeatedly with tap water at a pressure lower than 3kg/cm2. Dry and check the filter.
C. Use cleaning fluid.

3. Check the tightness of the track.

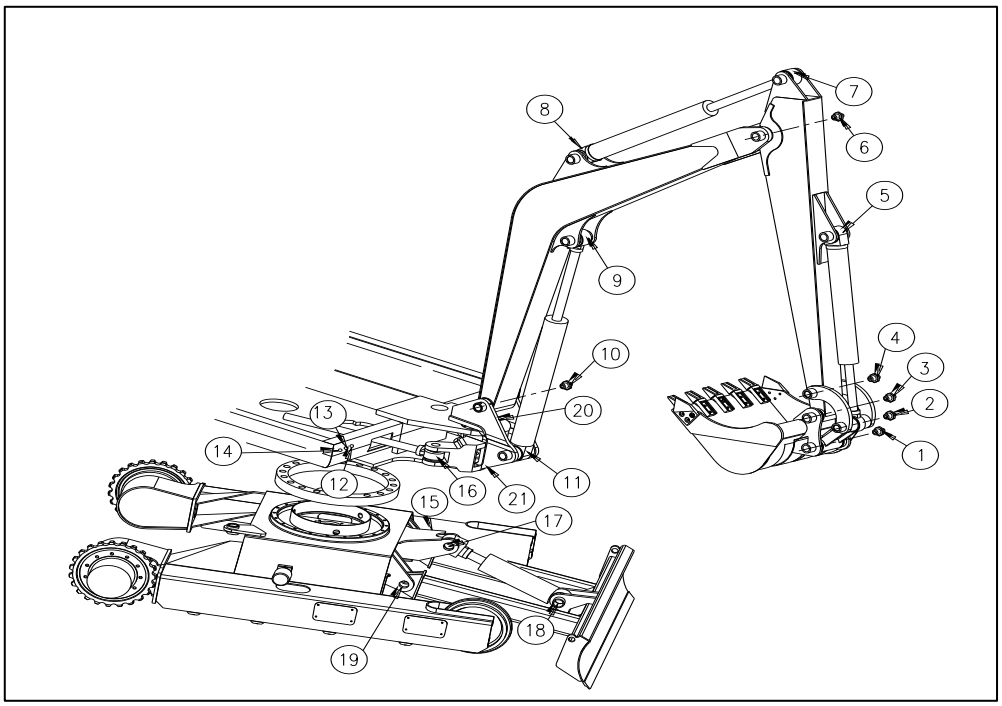
4. Replace bucket tooth.

5. Adjust the bucket clearance.

Section 3 Fuel, Cooling Fluid and Lubricating Grease

Mobil or Shell hydraulic oil should be used.

High-quality fuel, cooling fluid and lubricating grease should be used.



1	Connecting rod and bucket hinge point	12	Lubricating point for Swing Ring
2	Rod side lubricating point of Bucket cylinder	13	Lubricating point for Swing Ring’s raceway
3	Arm and bucket hinge point	14	Lubricating point for Swing cylinder, piston side
4	Rocker lever and arm hinge point	15	Bulldozer and track frame hinge point
5	Piston side lubricating point of Bucket cylinder	16	Lubricating point for Swing cylinder, rod side
6	Bucket arm and boom hinge point	17	Lubricating point for Bulldozer cylinder, rod side
7	Rod side lubricating point of arm cylinder	18	Lubricating point for Bulldozer cylinder, piston side
8	Piston side lubricating point of arm cylinder	19	Bulldozer and track frame hinge point
9	Rod side lubricating point of Boom cylinder	20	Steering head and platform hinge point, upper side
10	Boom and steering head hinge point	21	Steering head and platform hinge point, lower side

11	Piston side lubricating point of Boom cylinder		

Diagram of Lubrication Point

Chapter 6 Troubleshooting

The following is a summary of some common troubles.

Section 1 Electrical System

The lamps are not bright enough even when the engine is running at a high speed.

The lamps flash while the engine is running.

- Check if any wire connection is loose or circuit is open.
- Adjust the tightness of the fan belt.

The charging indication lamp does not light up even when the engine is running at a high speed.

- Replace DC generator.
- Check and repair circuitry.

Abnormal sound is heard from DC generator.

The starting motor does not rotate, with the starting key set at ON position.

- Check and repair circuit.
- Charge the battery.

The pinion of the starting motor engages and then disengages.

- Charge the battery.
- Replace safety relay.

The starting motor drives the engine too weak and too slow.

- Charge the battery.
- Check and repair the starting motor.

The pinion of the starting motor disengages before the engine is started.

- Check and repair the circuitry.
- Charge the battery.

Oil pressure indication lamp does not light up when START switch is turned to ON position.

- Replace the bulb.
- Replace the switch of the lamp.

Charging indication lamp does not light up when START switch is turned to ON position.

- Replace the bulb.
- Check and repair circuitry.

Section 2 Engine

The engine oil pressure indication lamp flashes after the engine has been warmed up and its revolution speed increased

- Refill engine oil to specified level.
- Replace oil filter.
- Check oil pipeline or connectors for leakage.
- Replace the bulb.

Vapor comes out from the upper part (pressure valve) of the radiator.

- Add cooling water and check for leakage.
- Adjust the tightness of the fan belt.
- Clean the internal of the cooling system.
- Clean or repair the radiator blades.
- Replace the thermostat.
- Tighten the cover of the radiator or replace the seal of the radiator cover.
- Replace the bulb.

The engine fails to start while the starting motor runs normally.

- Add fuel.
- Repair the fuel system to stop air leakage.
- Adjust the fuel injection nozzle pairs and check and repair fuel pump.
- Adjust the valve clearance.
- Refer to the section on electrical system.

The exhaust is white or black.

- The fuel injection nozzle fails to atomize fuel properly or there is water in the crankcase.
- Use specified fuel.

The exhaust becomes black occasionally.

- Clean or replace air filter.
- Replace injection nozzle.
- Check the compression system of the engine.

Combustion noise sometimes changes to surge.

• Replace the injection nozzle.

Abnormal combustion and mechanical noise

• Use specified fuel.

• Check for overheat.

• Adjust the valve clearance.

Section 3 Chassis

Traveling speed, swing speed, and movement of the boom, the arm and the bucket are slow.

• Refill oil to the specified level.

Abnormal sound is heard from the hydraulic oil pump.

• Clean the hydraulic oil tank filter.

Hydraulic oil temperature rises too fast.

• Clean oil cooler.

• Adjust the tightness of the fan belt.

• Refill oil to the specified level.

Track slips off. The sprocket is worn excessively.

• Adjust the tightness of the track.

The bucket lifts too slowly or fails to lift.

• Refill oil to the specified level.

Chapter 7 Transportation and Storage

Section 1 Transportation

1. When transporting the excavator, the operator must be familiar with the road conditions and observe the relevant traffic rules and regulations.

To load the excavator on a truck, the truck must be securely braked and chocked (a), and a bridge board (b) placed at the rear end of the truck.

★ The board must be strong enough with sufficient length and width to ensure safe loading and unloading of the excavator.

★ The gradient of the board must not exceed 15°.

★ If two bridge boards are used, the space between the two boards should be the same as that between the two tracks of the excavator.

2. Reduce the speed of the diesel engine and lower the working device as much as possible, and slowly drive the excavator up or down the truck.

★ Operating the traveling control levers only when moving on the bridge board.

★ Drive the excavator forward up onto the truck if the working device is installed; and back up onto the truck if the working device is not installed (as shown in the picture).

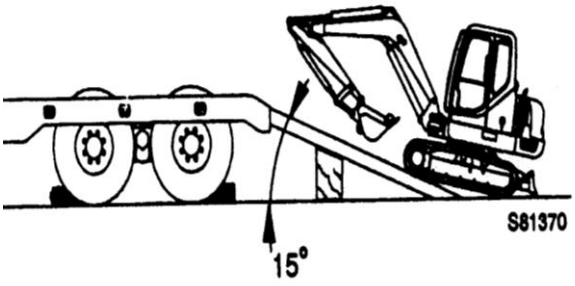
★ Align the excavator with the bridge board before driving onto the board. Do not attempt to make any turn once the excavator is already on the board.

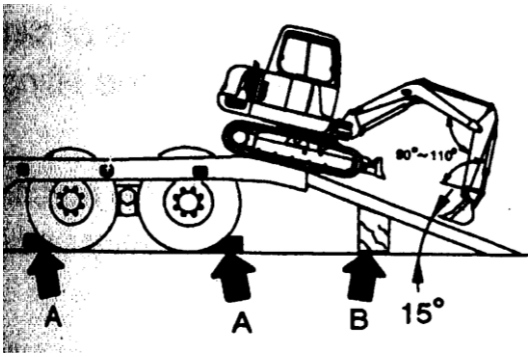
3. Park the excavator at the specified position on the platform of the truck. Fully extend the bucket and the arm cylinders, and then slowly lower the boom.

★ Wood blocks can be put under the bucket cylinder in order to prevent it from damage due to its collision with the surface of the platform of the truck.

4. Use hydraulic locks to secure all control levers (lift the left control box).

5. Wood blocks (chocks) must be placed in the front and at the rear of the tracks in order to prevent the excavator from moving back and forth during transportation.





Section 2 Storage

1. Before storage

If the excavator is not going to be used for a long time, it is better to put it in storage. In order to guarantee a minimum maintenance before reuse, the following precautions should be taken.

• Clean and dry all parts before putting them in storage. The excavator should be stored indoors in a dry environment. If you must store it outdoors, wood boards should be placed on the ground where the excavator is to be parked, and the excavator should be covered with canvas.。

• Before putting it in storage, replace engine oil, fill up fuel tank, and lubricate all locations requiring lubrication.

• Disconnect the clips of the battery and cover it properly, or remove the battery and store it separately.

• If it is predicted that the temperature is going to drop below 0℃, add a specified amount of antifreeze into the cooling water.

• Use locking bars to lock all control levers.

• If long time storage, smear the grease to the rod of the cylinder which expose in the air.

2. After storage

Before operation after a long storage, the following work should be done

• If long time storage ,wipe off the grease from the cylinder rods before operating.

• Start the engine once a month and drive the excavator for a short distance. This would allow all movable parts to be covered with a new film of oil.

• If antirust operation is needed indoors, good ventilation must be guaranteed so as to avoid poisoning by waste fume.

• Fill the fuel tank, lubricate the relevant parts as necessary and refill engine oil.

Chapter 8 Safety Rules

1. The excavator operator must be trained and certified, and read this Manual carefully and completely.

2. Make sure that there are no obstacles within the work area when operating an excavator.

3. To repair or check an excavator, its engine must be shutdown and its bucket lowered onto the ground or a bracket.

4. Do not adjust the relief valve and the overload relief valve of the hydraulic system. Adjustment can only be made by the after service people in our company or authorized people by our service center.

5. Never operate the excavator when you are tired or drunken.

6. In case of fire or other emergencies, stop the excavator immediately and use the fire extinguisher provided to put out the fire or use other available equipment. The most important things is the operator should master the fire fighting equipment.

7. When working indoors, keep an appropriate distance from the roof, make sure that the entrance, passageway and floor are strong enough to support the excavator, and guarantee proper ventilation to avoid exhaust gas poisoning.

8. Never allow any other non-certified people to operate the excavator.

9. Always remember: “Safety is the most important thing”.

10. Operators should operate the excavator as operating methods and safety rules in this Manual and within the specified working range. The customer shall be held responsible for all the consequences (failure or damage of any systems or mechanism) if any of the above-mentioned regulations is violated.

11. All operators have obligations and responsibilities to observe all relevant safety laws and regulations of the state, which exclusively govern these safety rules.

Afterword

Due to limited time in which to compile this Manual, there are some errors and omissions inevitably in it. We will work on its improvement by future corrections and additions and we look forward to your opinions and suggestions!

The editor
Sep 2005

Please tick the following questions in the Form below or write your opinions or suggestions in the blank provided and mail it back to us.

		yes	no
1. Is it easy to find information in the Manual?			
2. Is the Manual easy to read?			
3. Is the Manual easy to understand?			
4. Is the information sufficient?			
5. Is important information emphasized sufficiently?			
6. Are illustrations in the Manual easy to understand?			
7. Are descriptions and illustrations consistent with each other?			
8. Do you use Table of Contents?			

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