Operation & Maintenance Manual

SWE50B/SWE60B/SWE60UF/SWE70B/SWE80B /SWE90UB/SWE70F/SWE80F/SWE90UF Hydraulic Excavator

Sunward Intelligent Equipment Co.,Ltd.

Jan., 2019

FOREWORD

This manual will help users to operate and maintain the machine correctly.

It is particularly important that the machine operator should read these instructions carefully not only prior to using the machine for the first time (in order to become acquainted with its operation and special features), but also to take full advantage of its capabilities during use, or for lubricating and servicing operations. Otherwise accidents or damage may occur.

The manual should be regarded as the permanent part of machine and kept in the cab for consultation at any time. And the manual should be attached when the machine is transferred or sold.

The machine is designed according to the metric system, all the data presented are metric and only metric parts and apparatus can be used.

Position definition: RIGHT and LEFT always mean the left and right of an operator seated correctly in the machine. The drive sprockets of undercarriage are located at the rear.

Keep your machine number on this manual correctly for future query. When you order parts, dealers also need the number. If the manual is on the machine, please also keep these numbers safety in machine aboard.

Sunward guarantees to keep machine in good repair in term of service. The service details are showed in Maintenance Card supplied by distribution.

Maintenance Card guarantees can you get service or not in service period. In some conditions, even if machine is out of service term, Sunward can also supply the in site free service in normal.

For best machine performance, all instructions given in this manual should be complied with strictly. Possible warranty claims may be considered only provided that all operations are made by qualified operator and scheduled inspections are made at the specified times by qualified technician. Warranty claims will not be considered provided the machine is abused, overloaded, or if there are changes to the original functions of machines.

Only the holder of the license issued by the government, qualified, experienced operators are allowed to operate the machine. Similarly, only hold government issued license personnel can inspection and maintenance of the machine.

Regarding SAFETY in particular, we recommend carefully reading the SAFETY RULES in this manual and complying with all the safety rules.

All the information including charts and specifications in this manual is the latest that we can get. We reserve the right to make without prior notice any modification or amendment to machine component.

Sunward Intelligent Equipment Co., Ltd.

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1. SAFETY RULES

1.1 SAFETY MARK

Figure 1.1 is the mark to remind of safety, when you see this mark on the machine or in the manual book; it indicates that the human body is in danger of injury.

1.2 SAFETY LABEL

Figure 1.2.1

Figure 1.2.3

Figure 1.2.2

There are various labels at various points of machine, in these labels, various words indicate various hurt risks, such as “DANGER”, “WARNIGN”, “CAUTION” etc (as right figures), they means as follows:

- DANGER (As figure 1.2.1)—indicates an imminently hazardous situation which, if not avoided, could result in death or serious injury.
- WARNING (As figure 1.2.2)—indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
- CAUTION (As figure 1.2.3)—indicates potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

“DANGER”, “WARNING” safety labels are stuck at given points of machine within the range of possible danger. General attentions listed on the “CAUTION” safety label. In this manual book, “CAUTION” also remind of safety instruction.

Figure 1.3

1.3GENERAL SAFETY INSTRUCTION

The safety instructions in this chapter only include the general safety rules of machine. They can’t cover all the possible dangers. If there is any problem, please report to your superior before operation and maintenance.

(As figure 1.3)

(1) Study the manual carefully and follow the safety instructions in the labels and manual before operating the machine.

(2) Always keep the safety labels clean. Change any lost or damaged label with a new one. If the labels or manual book lost, you can contact dealer and indicate the model of machine to purchase a new one.

(3) Only qualified operator is permitted to operate this machine. Keep the machine in good condition as per this manual.

(4) Don't refit machine without authorization, otherwise it will affect the performance and service life of machine, or may cause human body hurt or even death.

1.4 PREPEARE FOR EMERGENCY

All concerned people should be cautions so as to prevent accident occurring, and at the same time, deposit first-aid kit and fire extinguisher nearby (As figure 1.4), and place the phone numbers of hospital and fire department near telephone to ask for help in case of emergency.

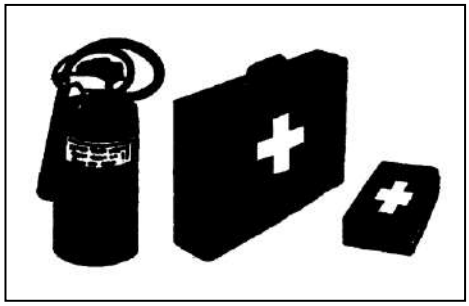


Figure 1.4

1.5 WEARING SAFETY PROTECTIVE ARTICLES

Before operation, always wear protective articles when the work so requires, they include (As figure 1.5):

Skintight work clothes

Hard hat

Safety gloves

Safety glasses, goggles, or veil

Respirator or filtration veil

Earplug or ear cap

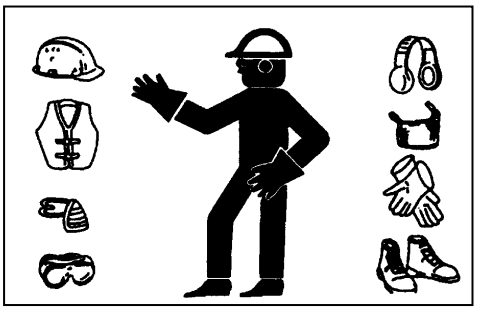


Figure 1.5

1.6 CHECKING MACHINE BEFORE START-UP

Before start machine every day or every shift, check the machine according to the contents in "Check machine before start-up" of this manual.

Figure 1.7

1.7 SEAT ADJUSTMENT

If you use this machine for the first time, or change operator, the operator should adjust seat (As figure 1.7) to suit himself: back on the seat, the feet can operate the pedals at ease. (Refer to 2.5 seat for details)

1.8 ENTERING OR LEAVING MACHINE

1) Always face the machine when you use the steps and hand-holds to enter or leave machine (As figure 1.8).

2) Never use any control lever as hand-hold.

3) Never enter or leave machine when the machine travels, swings, or digs (lifts).

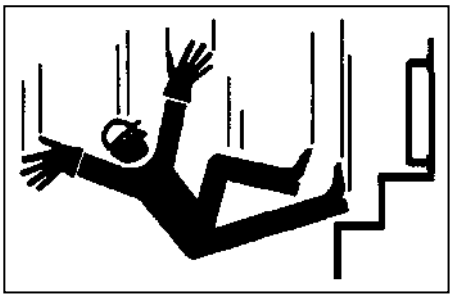


Figure 1.8

1.9 STARTING ENGINE CORRECTLY

The operator must sit on cab seat to start engine. Not allow starting engine with the operator standing on crawler.

Not allow starting engine with short circuit start-up (including terminal start-up, as figure 1.9).

Figure 1.9

1.10 FORBID CARRYING PASSENGERS

When the machine is operating or traveling, prohibit other people except operator staying on the machine (As figure 1.10).

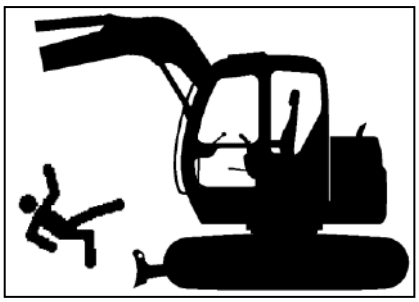


Figure 1.10

1.11 KEEPING MACHINE AWAY FROM ELECTRICITY TRANSMISSION LINE

Any part or load of machine touching electricity transmission line will cause human death or GBH.

Prohibit machine or its load closing to electricity transmission line, the machine should be 3 meters away from line (As figure 1.11).

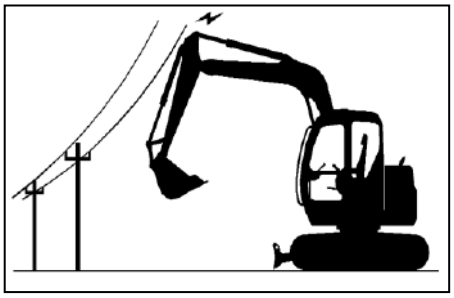


Figure 1.11

1.12 MOVING MACHINE SAFELY

1) Before the machine travels and swings, operator should know the position of other people.

2) When machine travels or before it swings, operator should warn other people by ringing the horn.

3) Operation at confined area, should use signal in swinging, and harmonize the hand signal before machine start-up.

4) Before operate the machine traveling, must confirm that the operation of traveling pedal/control lever should be corresponding with the traveling direction.

5) Treadle the foreside of traveling pedal or push traveling lever forward, and the machine will travel along tension wheel. By contraries, the machine will travel along sprocket wheel.

6) When machine travel on slope, place bucket as figures showing, keep bucket 200-300mm up the slope ground, if the machine slides or becomes unstable, set the bucket down at once(As figure 1.12).

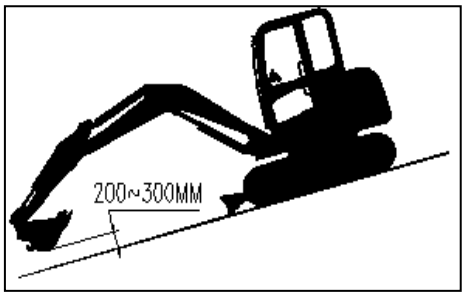


Figure 1.12.1

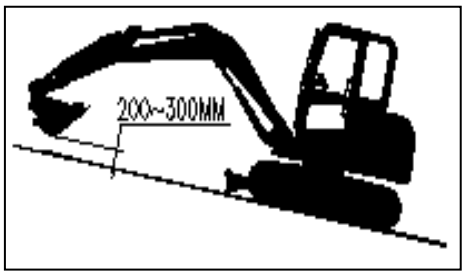


Figure 1.12.2

1.13 PREVENTING ACCIDENTS WHILE BACKING OR SWINGING

1) In order to prevent accident while backing or swinging, the operator must follow:

2) Before back or swing the machine, look round and confirm nobody is around.

3) Ensure that other people standing out of the boom swing range.

4) Pay attention to that whether other people stay in work range or not. Ring horn or use other signal to warn before move the machine.

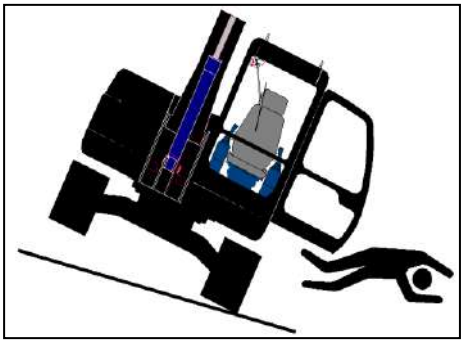


Figure 1.13

5) If the operator's vision is blocked when the machine backs, a signalman is needed and the signalman should always be seen.

6) If signalman needed, the signalman should use hand signal. Only when both signalman and operator understand the meaning of signal, the operator can operate the machine traveling and swinging (As figure 1.13).

1) Understand all the meanings of flag, mark, and signal, and determine the person who is in charge of signaling.

2) Keep the cleanness of window, mirror, and lamp.

3) When the visibility weakened by dust, rain, and fog, etc, lamplight should be used.

4) Please read carefully and understand well the contents of this manual book.

1.14 DIGGING SAFELY

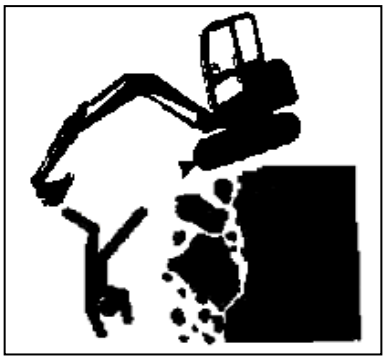


Figure 1.14.1

1) Before digging work, operator should be aware of the position of embedded lines, such as cable, gas pipe, water supply pipe, and operate the machine carefully to prevent accident.

2) All the non-working people should be away from the working range of machine.

3) Make sure the ground of working site is hard enough to support machine (As figure 1.14.1).

4) When the machine works at pithead, the tension wheel end should be outward pithead, keeping the traveling orientation vertical with pit cliff. In this way, the machine can move away easily when the cliff collapses.

5) When the machine works in the deep, it should prevent the boom bottom and cylinder from colliding with high objects.

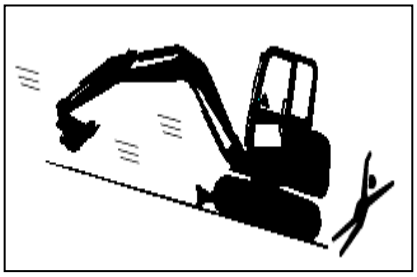


Figure 1.14.2

6) Turn over prevention

7) When the machine works on slope, the track should park along the slope, retract the bucket as much as possible, keep the bucket close to ground and machine, to avoid turning over (As figure 1.14.2).

- When swing with load, it must decrease swing speed to avoid turning over. When working on frozen ground, it should prevent the ascending temperature from causing the ground to soften; otherwise it will affect the stability of machine.

7) During operation, prevent boom or arm from colliding with high objects.

8) The bucket only for digging work, not allow using bucket to work as pneumatic pick or hydraulic breaker does.

1.15 AVOID MACHINE UNCONTROLLED

When the machine loses control, if someone tries

to mount on or stop moving machine, it will cause GBH or death (As figure 1.15.1).

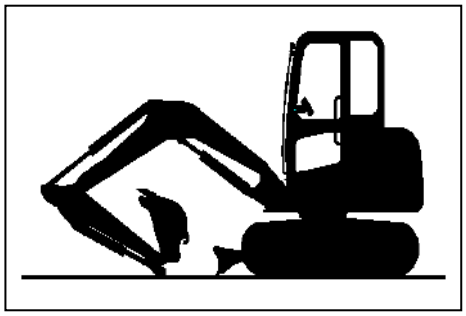


Figure 1.15.1

To avoid the machine losing control, pay attention to the following proceedings:

- Place the machine on horizontal ground, try your best not to stay on slope, and stop machine as following procedures:
- Lower the bucket to the ground.
- Run engine at low revs for 3 minutes to cool down machine.
- Stop engine, take out key from key switch.
- Switch off pilot control.

If the machine has to stay on slope, use chocks to block crawler, lower bucket, and plug bucket teeth into ground.

Fix the machine well to avoid accidental movement.

Park the machine away from other machines for proper distance.

1.16 PARKING MACHINE SAFELY

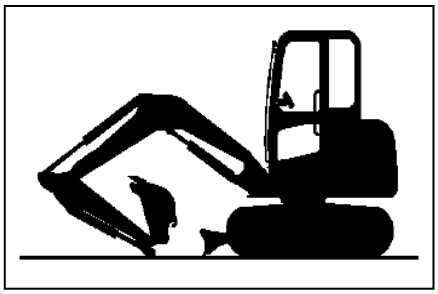
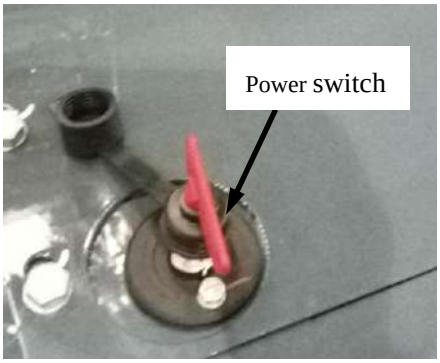


Figure 1.16

Stop machine as following schedule (As figure 1.16):

- Place machine on horizontal ground.
- Lower the bucket to the ground.
- Run engine at low rev for 3 minutes.
- Place the timing handle at stop position, screw the ignition key to “OFF” position.
- Switch off pilot control.
- Close window, top window, and cabin.



1.17 SAFE MAINTENANCE

1) Attention of maintenance:

Before work, be aware of maintenance rules.

Keep the working area clean and dry.

Don’t allow inject lubricant or maintain to moving machine.

Avoid body and clothing touching with transmission parts.

2) Preparation for maintenance

Place the machine on horizontal ground.

Lower the bucket to the ground.

Run engine at low rev for 5 minutes.

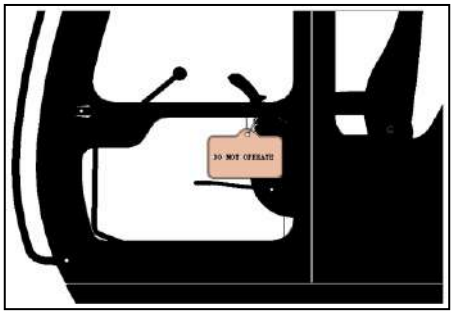


Figure 1.17.1

Pull stop handle forward, stop engine, take out key from the switch.

Hang the “DO NOT OPERATE” label at control lever (As figure 1.17.1).

Switch off pilot control.

3) Safety in maintenance

If the maintenance must be made during the engine operation, there must be somebody in cabin.

If the machine must be lifted, the angle between boom and arm must be kept between 90-110 °, to support the lifted parts stably in maintenance work (As figure 1.17.2).

Never work under the machine being lifted by boom.

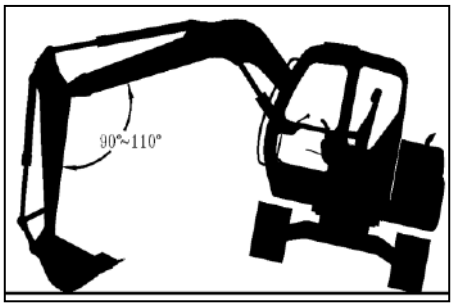


Figure 1.17.2

- Check some parts in regular interval, and repair or replace, if necessary. (refer to the chapter “maintenance” of this manual)
- Make sure all parts are in good condition and fitted correctly. Replace wearing or damaged parts. Clean any accumulative lubricant or scraps.
- When adjust electric system or weld on machine, disconnect grounding cable (-) of battery.

1.18 SUPPORTING MACHINE SAFELY

1) Prohibit repairing or maintaining machine before the machine well supported.

2) Before maintenance, lower the work device to the ground.

3) If the machine or work device have to be lifted for maintenance purpose, the machine or work device should be well supported.

4) Don’t support the machine on the slag, hollow brick, or other fragile objects.

5) Don’t work under machine when the machine only supported by a jack.

1.19 CLEANING TRASH ON THE MACHINE

1) Keep the engine, radiator, battery, hydraulic line, fuel tank, and cabin clean.

2) After stopping engine, the surrounding temperature may rise immediately (As figure 1.19). Open overhaul gate to cool engine as soon as possible and clean engine apartment.

3) Clean machine at regular interval, eliminate accumulative lubricant and other trash. Make sure not to spray water or vapour into cabin.

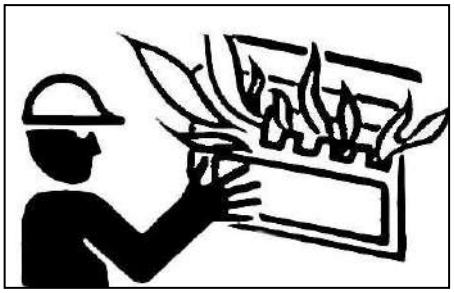


Figure 1.19

1.20 PREVENTING BATTERY FROM EXPLODING

1) Prohibit fire or flame close to the battery top, otherwise the battery gas will explode (As figure 1.20).

2) Check the electricity deposit with voltage meter or gravimeter. Don't place metal bestriding connection rod to check electricity deposit.

3) Never electricize the frozen battery, otherwise it will explode. The battery should be warmed up to 16℃(60℉).

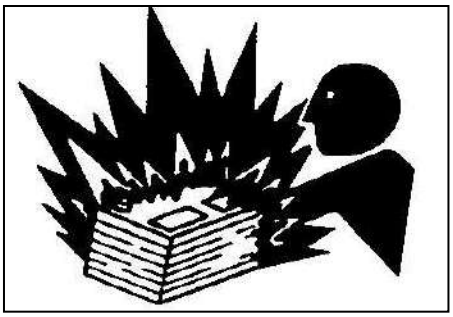


Figure 1.20

1.21 STORING PARTS SAFELY

1) The stored parts, such as bucket, hydraulic breaker, etc, are likely to fall down, causing GBH or death.

2) By all effective means, store parts and machine safely to prevent falling down. Don't permit unauthorized people, especially children, closing to the parts storage area.

1.22 PREVENTING SPLASH OBJECTS

1) Prevent splash metal or grits hurt, wear blinkers or safety glass (As figure 1.22).

2) Before knock on object, check whether somebody else is in the working area or not, and stop other people entering in the working area to avoid hurt.

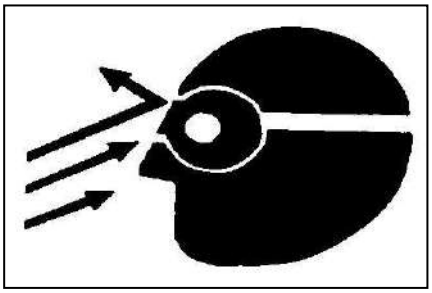


Figure 1.22

1.23 PREVENTING FLYING-OFF PARTS

In operation or maintenance, take care of the parts that may fly off, human body and face must avoid the

possible flying off parts.

1.24 AWAY FROM TRANSMISSION PARTS

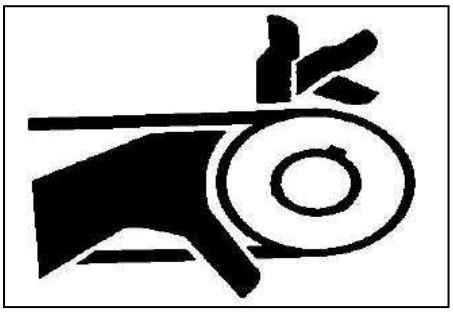


Figure 1.24

1) Touching transmission parts may cause GBH.

2) When work around the transmission parts, in order to avoid accident, prevent hand, foot, hair and clothes from entangling in the machine (As figure 1.24).

1.25 PREVENTING ASBESTOS DUST INHALATION

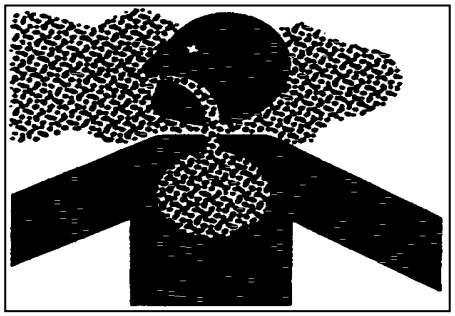


Figure 1.25

1) Prevent inhaling possible asbestos dust (As figure 1.25), for the asbestos fiber may cause lung cancer.

2) Some washers contain asbestos fiber, in these components, normally, the asbestos is in the resin or enveloped in some way. If the asbestos-contained parts don't bring dust, there isn't danger in normal disposal.

3) To avoid causing dust, don't clean with compressed air, and avoid brushing and grinding asbestos-contained materials. In maintenance work, please wear regulated respirator, use special dust collector to clean asbestos. If can't get this dust collector, use little oil or water to bemoisten asbestos-contained material. Comply with working area rules and concerned asbestos disposal rules, stop other people entering in working area.

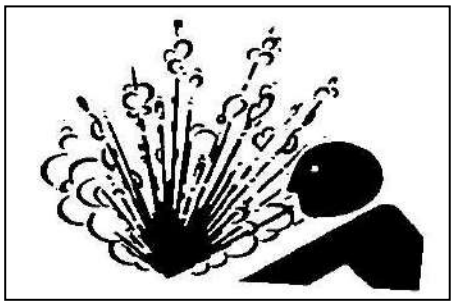


Figure 1.26

1.26 BEWARE OF FOG OR GAS INHALATION

1) Inhale engine exhaust gas will cause disease, so much as, or death.

2) If it is necessary to operate machine in the building, should open door and window to ensure well ventilation, or use long exhaust pipe to discharge smoke (As figure 1.26).

1.27 BEWARE OF SCALDING

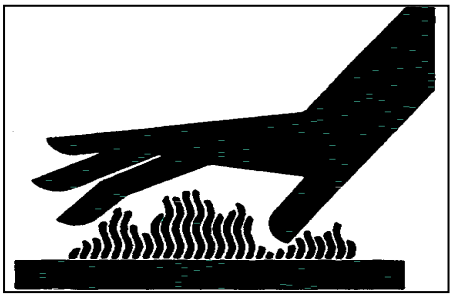


Figure 1.27

1) During operation, engine oil, gear oil, hydraulic oil will become hot. Meanwhile, engine, hose, pipeline, and

other parts will also become hot. Beware of scald (As figure 1.27).

2) Carry out inspection and maintenance after oil and parts are cooled to prevent scald. The hydraulic oil tank and pipeline are high pressured, before maintenance or replacement, it should release the pressure to avoid hot oil erupting.

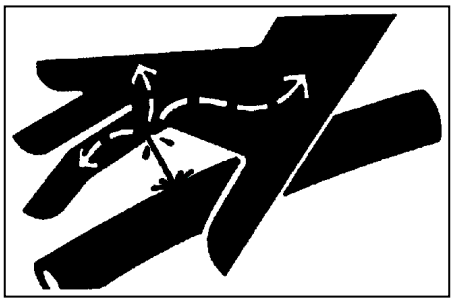


Figure 1.28.1

1.28 BE CAREFUL TO PRESSURE LIQUIDS

1) Effluent liquids in high pressure will penetrate through skin, causing GBH (As figure 1.28.1).

2) Release pressure before disjoining liquids or other pipeline to avoid this danger. Operate control lever many times to release pressure.

3) Before supercharging, tighten all the connections.

4) Inspect leakage with cardboard, make sure to protect your hand and body against touching high pressure liquids (As figure 1.28.2).

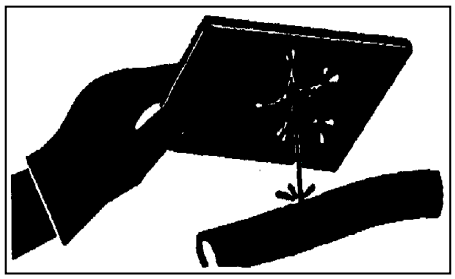


Figure 1.28.2

5) If accident occurs, see the doctor at once.

6) Any liquid penetrated in skin must be cleaned within few hours. Otherwise it will cause necrosis.

1.29 NO HEATING NEAR PRESSURE OIL PIPE

1) If heating near pressure oil pipe, the inflammable spray will cause severe burn to nearly people. Don't carry out welding, gas protection welding, or gas cutting near pressure oil pipe or other flammable goods.

2) If it is a must to carry out welding, gas protection welding, or gas cutting near pressure oil pipe, it should mount temporary fireproof jacket to protect hose or other materials (As figure 1.29).

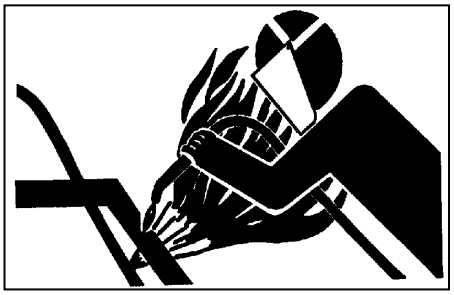


Figure 1.29

1.30 NO HEATING INFLAMMABLE LIQUID PIPE

Not permit to weld inflammable liquid steel pipe or hose. Before

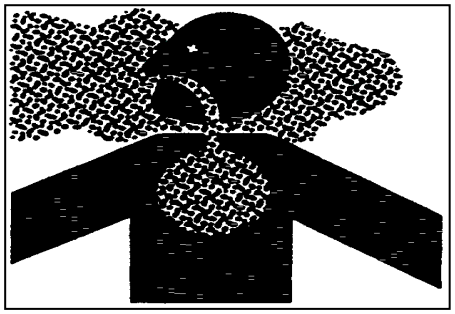


Figure 1.31

welding this kind of pipe or hose, clean this pipe or hose completely with incombustible solvent.

1.31 ATTENTION ON WELDING & POLISHING

- The welding should be carried out on the ventilation area as for it may cause gas and fire.
- Before welding, please put the flammable objects to the safety place.
- Only the licensed operators are allowed to weld. It's stictly forbidden to weld by unlicensed workers.
- Put the flammable objects to a safety place before polishing which may cause sparks.
- Make sure there's no spark, smoke or any other abnormal at the working area and the surrounding after finishing welding and polishing.

1.32 REMOVING PAIN BEFORE WELDING OR HEATING

Prevent bringing potential poisonous gas and dust.

When paint heated up by welding or other methods, it will cause poisonous gas.

Remove paint as following methods before welding or heating up.

- Rub out paint with abrasive paper or wheel, during this work, remember to wear regulated respirator to prevent inhaling dust (As figure 1.31).

- Rub out paint with solvent or paint remover. After rubbing out, clean paint remover with soap and water before welding. Before welding or heating up, volatilize the paint remover gas at least 15 minutes.

The paint removing work should be operated at outdoor or well ventilation site.

1.33 NOTES FOR WELDING ON MACHINE EQUIPPED WITH ELECTRONIC CONTROLLER AND ENGINE

The welding procedures should be strictly followed *Welding Technical Universal Guidelines* to avoid damage of electronic controlling devices and bearings. Before welding, dismantle the parts which need to be weld from the machine if possible. If it's inevitable to weld on the machine, please disassemble the electronic controlling device from the machine before that. The following steps should be obeyed.

- Shut down the engine and turn the starting switch to OFF position.
- Turn the battery switch to OFF position, if there's no such switch, dismantle the negative cable of the battery. All connection plug of the main engine and the products with controller including the electronical controlling engine should be pulled out.
- The wiretapping of the electric welding machine connect the welding parts loacally and fastenly.(Note: Don't use the ground point of the electric parts or electrical parts as the ground point of electric welding machine.) Make sure the sealed parts or bearing and other connection parts are not be connected by the electricity from welding wiretapping to the welding position. Besides, it's forbidden to use the pin shaft of work device, the ground point of electrical parts or the surrounding area of hydraulic cylinder as the connecting zero point. Otherwise, it may damage the hydraulic parts, electrical parts and transmission

parts.

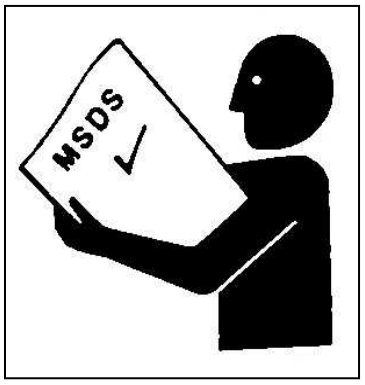
- Clean off the wires, diesel tubes, hydraulic pipeline, oil and sundries within one meter area of welding parts. Insulation block should be taken to those unmovable and can't be elimated things. Take high temperature protection measures for welding parts to avoid the efficiency losing of parts and fire caused by high temp.
- Pay attention to the damage of glasses and surrounding parts caused by fly-out and clean it off at once.
- While welding on the key structure positions, it's necessary to take reasonable welding scheme to prevent structure damage from welding transfromation.
- It's not allowed to weld oil tank, cylidner, air bottle without professional safety measurements.

1.34 DISPOSING LIQUID SAFELY

1) All fuels, majority of lubricants, and some coolants are inflammable. These inflammable liquids should be stored away from fire, not permitted to stab or set storage case on fire.

2) Dispose fuel carefully, stop engine before adding fuel, and prohibit smoking while adding fuel or using flame near the machine being added fuel. Add fuel at outdoor site.

3) Don’t put oil-containing rags on the machine to ensure machine clean.



1.35 DISPOSING CHEMICAL SAFELY

Touching deleterious chemical directly will cause serious injury to human body. The chemical using in excavator, such as lubricant, coolant, dope, and adhesive, may be deleterious.

Before using deleterious chemical, you should check and understand its danger, know how to operate safely, and use recommended implement to work.

1.36 PREVENTING FIRE

In order to avoid fire, following methods are necessary (As figure 1.34).

- Check the leakage, the leakage of fuel, hydraulic oil and lubricant may cause fire.

Inspect clamps whether lost, damaged or loosened or not, hose twisted or not, attrition between hose and hard pipe or not, oil cooler damaged or not, and oil cooler connection loosened or not. Use a piece of cardboard to check leakage, never check leakage with nude

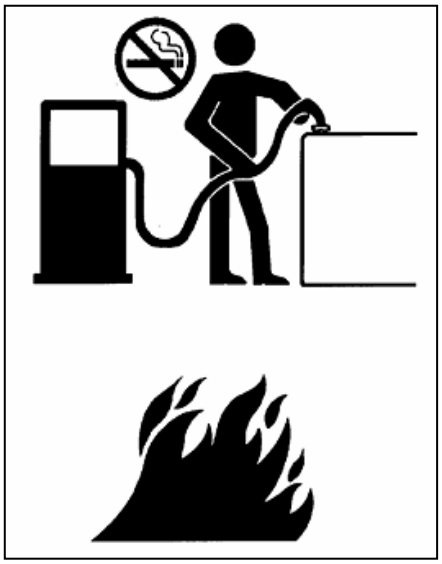


Figure 1.34

hand to prevent pressured oil shooting up causing injury.

Tighten, repair, or replace any clamps, pipe, hose, oil cooler, and flange bolt of oil cooler.

Don’t twist or knock on high-pressured pipe.

Don’t assemble twisted or damaged pipeline or hose.

- Inspect short circuit. The short circuit of electric system can cause fire.

Before every shift or 8 hours operation, check loosened, twisted, hardened, or cracked cable and wire.

Before every shift or 8 hours operation, check lost or damaged connectors.

Before operation, tighten, repair, or replace any loosened or damaged cable, wire and connector. If the cable or wire is loosened or twisted, don’t operate the machine.

- Repair switch

Before everyday operation, check the function of key switch and engine emergency stop switch. If there is any unusuality, must repair at once. In case of fire, if you can’t stop engine, it will aggravate firepower, and may cause GBH.

- Clean out inflammable materials

Spilled fuel, stored breeze, and other inflammable materials, may cause fire. Keep the machine clean every day to prevent fire.

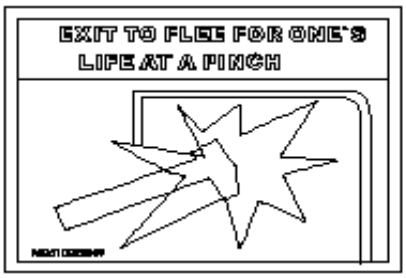


Figure 1.35.1

1.37 EMERGENCY EXIT

Emergency exit mark (As figure 1.35.1):

When there is an emergency and the operator can not get out of the cabin, take the small hammer (As figure 1.35.2) hung on the wall in cabin to break the window with emergency exit mark to leave the machine. The cabin safety structure can not be repaired after damage but it can be replaced with other qualified safety protective structures.

Figure 1.35.2

CAUTION

(1) Pay attention not to be hurt by the splashing objects while breaking the window with a certain distance to the breaking hole for safety.

(2) The breaking hole should be big enough for operator to get out (according to operator’s own condition) and the hole should have no sharp spines for safety.

1.38 NOISE

According to ISO3744:1995 & ISO6395:1988： the machine fulfills the requirements of the Directive 2000/14/EC and the directive 2005/88/EC, result is as following:

Noise at operator's position：L_{pA}= 80.2dB;
Machine noise：L_W= 98 dB

1.39 OTHER SAFETY MARKS

- Warning：Please do not get near to the machine when it is being operated (As figure 1.37.1).

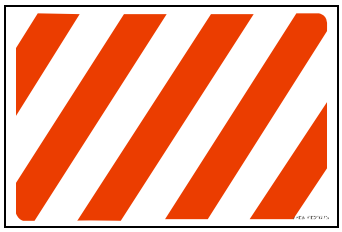


Figure 1.37.1

- Warning：Please do not get near to the machine when machine working equipment is being operated (As figure 1.37.2).

Figure 1.37.2

- Warning：Please do not stop engine before opening engine hood (As figure 1.37.3).

Figure 1.37.3

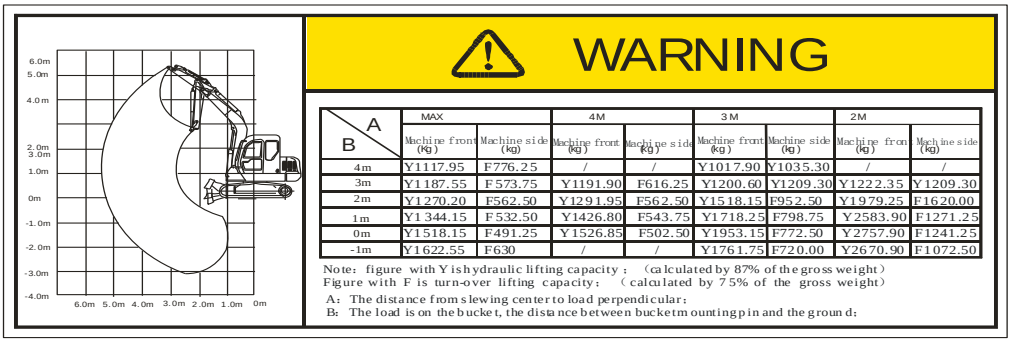
- Warning： Please stay away from the loader arm clearance area (As figure 1.37.4).

Figure 1.37.4

- Warning：Please stay away from the rotating area (As figure 1.37.5).

Figure 1.37.5

- Warning：Pay attention to machine's lifting capacity in operation (As figure 1.37.6).



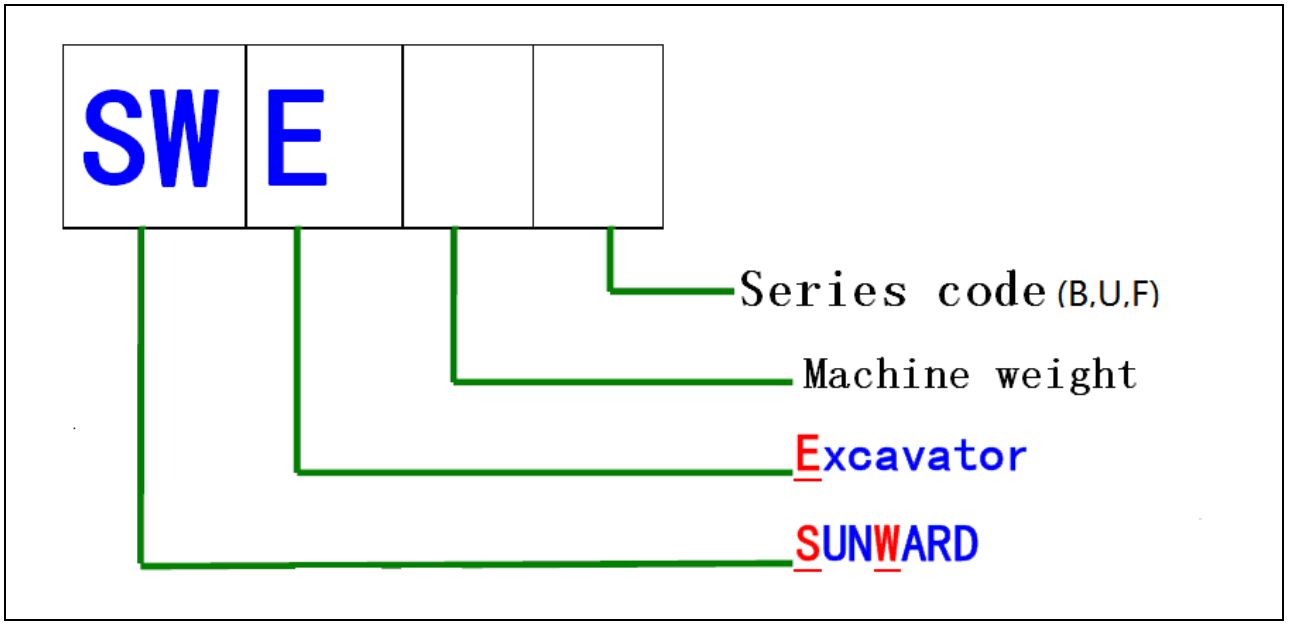
A / B	MAX		4M		3M		2M	
	Machine front (kg)	Machine side (kg)	Machine front (kg)	Machine side (kg)	Machine front (kg)	Machine side (kg)	Machine front (kg)	Machine side (kg)
4m	Y1117.95	F776.25	/	/	Y1017.90	Y1035.30	/	/
3m	Y1187.55	F573.75	Y1191.90	F616.25	Y1200.60	Y1209.30	Y1222.35	Y1209.30
2m	Y1270.20	F562.50	Y1291.95	F562.50	Y1518.15	F952.50	Y1979.25	F1620.00
1m	Y1344.15	F532.50	Y1426.80	F543.75	Y1718.25	F798.75	Y2583.90	F1271.25
0m	Y1518.15	F491.25	Y1526.85	F502.50	Y1953.15	F772.50	Y2757.90	F1241.25
-1m	Y1622.55	F630	/	/	Y1761.75	F720.00	Y2670.90	F1072.50

Note: figure with Y is hydraulic lifting capacity; (calculated by 87% of the gross weight)
Figure with F is turn-over lifting capacity; (calculated by 75% of the gross weight)
A: The distance from slewing center to load perpendicular;
B: The load is on the bucket, the distance between bucket mounting pin and the ground;

Figure 1.37.6

2. MACHINE FAMILIARIZATION

Machine name



Extra function:

B means the engine which is conform with Euro ⅢA

F means the engine which is conform with Euro ⅢB

U means zero tail swing

2.1 CAB

As figure 2.1 shown

Figure 2.1

2.2 MONITOR METER

1 Cooling water temperature meter	2 GPS normal communication
3 Cooling water overheat indication	4 High engine oil pressure indication
5 Preheating indication	6 Check parameter
7 Meter settings	8 Buzzer
9 Help/mute	10 Engine speed indication
11 Air filter clogging indication	12 Fault indication of charging
13 Low fuel oil level indication	14 Work hour meter
15 Fuel oil level meter	16 Clock

2.2.1 METER FUNCTIONS

1. Simulative/numerical oil level	2. Simulative/numerical water temperature
3. Numerical rev	4. Numerical voltage
5. Working hours	6. Preheat indication
7. Fault record	8. Low oil pressure alarm
9. Low oil level alarm	10. Water overheat alarm
11.Air filter clogging alarm	12. Oil filter clogging alarm
13. GPS communication	14. Charging alarm

2.2.2 DISPLAY RANGE AND ALARM STATEMENT

1. Water temperature meter: Displayed by finger and numerical. If water temperature over than pre-set, corresponding label will displayed in warning labels area; 2 seconds later, the red indicator light lights on and the buzzer activated. This fault will be recorded.
2. Fuel meter: Displayed by finger and numerical. If fuel level lower than warning level, corresponding label will displayed in warning labels area; 10 seconds later, the red indicator light lights on and the buzzer activated. This fault will be recorded.
3. Working hours: Displays 6 digits (includes 1 digit behind radix point), displays 99999.9 hours at most; when the machine is working (rotating speed fast than 200r/min or oil pressure over 0.1 Mpa), the meter begins to count.
4. Voltage: Displayed numerically. Display the real value of voltage.
5. Rotating speed meter: Displayed numerically. Display range form 0 to 9999r/min. Number of tooth is optional from 0 to 999.99.
6. Air filter: When air filter jam-up alarm switch earths, 5 seconds later, corresponding label will displayed in warning labels area; the red indicator light lights on and the buzzer activated.
7. Oil filter: When oil filter jam-up alarm switch earths, 5 seconds later, corresponding label will displayed in warning labels area; the red indicator light lights on and the buzzer activated.
8. Charging indication: When generator stopped, corresponding label and description will be displayed in monitor.
9. Pre-heat indication: Input 12V power supply, the indicator lights on. And description will be displayed.

2.2.3 BUTTONS

Figure. 2.2.2

The four buttons of the first line under monitor, their functions will be displayed in monitor, different description according to different functions. If the description in blank, means corresponding button is useless at present.

By operating buttons, the monitor will display information as water temperature, oil temperature, oil pressure, level of oil, model, edition of software and warning values; engine tooth is controllable by buttons.

F1 Examine machine parameter

F2 Set machine meter

F4 Help/Mute button

Users may change clock and stage hourmeter by entering the setting interface. The initial code is 888888.

2.3 CONTROL PANEL

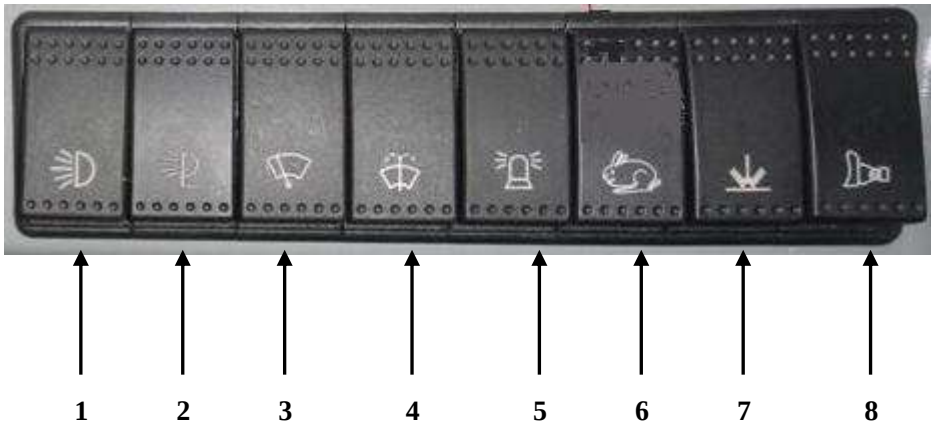


Figure 2.3.1

1. Boom light switch
2. Platform light switch
3. Wiper switch
4. Washer switch
5. Warning light switch
6. High speed traveling switch

7. Breaking/swing switch(optional)

8. Dozer blade conversion switch

9. Key switch

10. Cigar lighter

1 —Work lights switch

This switch turns the work light on and off. When press the switch, the work light and the green light turn on; when press the switch again, the work light and the green light go out.

2 — Platform light switch

This switch turns the Cabin top light on and off. When press the switch, the cabin top light and the green light come on; when press the switch again, the top light and the green light go out.

3 — Wiper switch

This switch turns cabin wiper on and off. When press this switch, wiper begin to work, green light comes on; press this switch again, green light goes out, wiper stop work.

4 — Wahser switch

This switch turns washing water on and off. When press this switch, washing water begins to work, the light comes on; press this switch again, the light goes out, washing water is turned off.

5 — Warning light switch

This switch turns the warning light on and off. When press the switch, the switch light flashes and the red light turns on; when press the switch again, the red light turns off and the warning light stops flashing.

6 — High speed traveling switch

Press this switch, green light comes on, the machine is on high speed condition; press this switch again, green light goes out, the machine is on low speed condition.

7 — Breaking/swing switch (optional)

This switch controls the movement conversion between boom swing and breaking works (if the machine equipped with them)

8 — Dozer blade Conversion switch (optional)

This switch controls the movement of blade ,press the switch,then operate blade pilot valve ,blade starts to work.(if the machine equipped with blade)

9 — Key switch (As figure 2.3.2)

① —OFF （engine stop）

② —ON （power on）

③ —HEAT (preheating)

④ — START （start engine）

10 — Cigar lighter (As figure 2.3.3)

Press this device, it will rebound after few seconds, take it out and kindle cigarette.

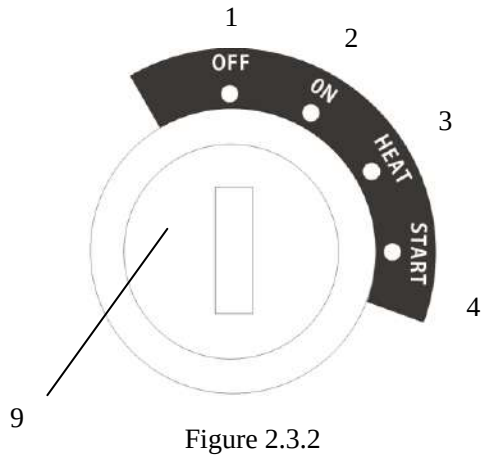


Figure 2.3.2

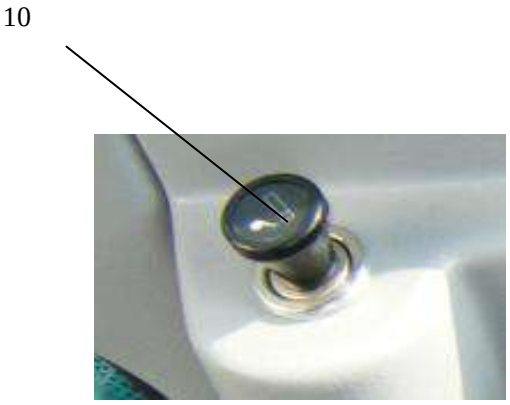


Figure 2.3.3

2.4 RADIO

2.4.1 Panel Functions

Figure 2.4.1

1. Power switch 2. Sound mode 3. Automatic storage 4. Upward select
5. Downward select 6. Wave select 7. Mute 8. Volume 9. Play/Pause
10. Fast backward/Forward 11. Radio prestore 3/Repeat play 12. Radio prestore
13. Radio prestore 14. Function selection mode 15. USB/SD built-in connector

2.4.2 Performance Index

FM wave

Range of frequency……87.5~108.0MHZ

Utility sensitivity……12dB

Noise ratio……55dB

Stereo resolution……≥30dB

Modulated waveband

Range of frequency……522～1620KHZ

Utility sensitivity……35dB

Power amplifier

Output power……Max.output2X15W

Distortion factor……≤0.5%

Bass boost/reducer……+/-9dB

High pitch boost/reducer……+/-9dB

Comprehensive parameter

Work pressure……direct current 12V～24V，negative earth

Output wire……High power output of two channel

Horn resistance……4～8Ohm

Fuse……3A

2.4.3 Operation Instructions

(1) ON and OFF:

Power button ⏻ ， shortly press，the shutdown state according to boot，the boot state press off.

(2) Sound storage（AMS）:

Shortly press,select among BAS,TRE and VOL.

(3) Channel selection/musical selection:

The upward selections (⏮), shortly press, radio frequency descending direction mode to automatic station search, playback mode switch to the next song. Long press, enter into the manual station search, then each short by decreasing a frequency step.

Downward selection (⏭), short press, radio frequency mode to increasing direction of

automatic station search, playback mode switch to the next song. Long press, into the manual station search, then each short by incrementing a frequency step.

(4) Band selection keys（BAND）：

Radio mode, pressing this button repeatedly can recycle select band: FM1—FM2—FM3—AM1—AM2.

(5) Mute：

Shortly press, ON/OFF mute

(6) Adjust volume（▲/▼）：

Tone or volume+/-.

(7) Play pause key（⏯）：

Radio mode: shortly press, broadcast radio station number 1 storage; long press, the currently playing station can store into the 1 station. Play mode: short press to pause / play.

(8) Rewind / fast forward（◀◀/▶▶）：

Radio mode：Short press, broadcasting station of No. 2, No. 4 for radio, long press, the currently playing station to No. 2 and No. 4 table. Play modes: short press, rewind / fast forward playback, then a short time exit to rewind or fast forward. Shortly press, broadcast No.2.

(9) Radio prestorage 3/Repeat playing key（3/RPT）：

Radio: short press, broadcasting radio station number 3 storage, long press, the currently playing station to the 3 station. When playing a MP3, short press, repeat broadcasting the current folder.

(10) Radio prestorage 5/F-：

Radio: short press, broadcasting radio station number 5 storage, long press, the currently playing station to the 5 station. When playing a MP3, short press, play the next folder.

(11) Radio prestorage p6/F+：

Radio: shortly press, broadcasting radio station No. 6 storage, long press, the currently playing station to the 6 station. When playing a MP3, short press, play the next folder.

(12) Function selection mode（MODE）：

Cyclic switching among RADIO, USB and SD three models, not inserted SD card, SD card mode automatically hide.

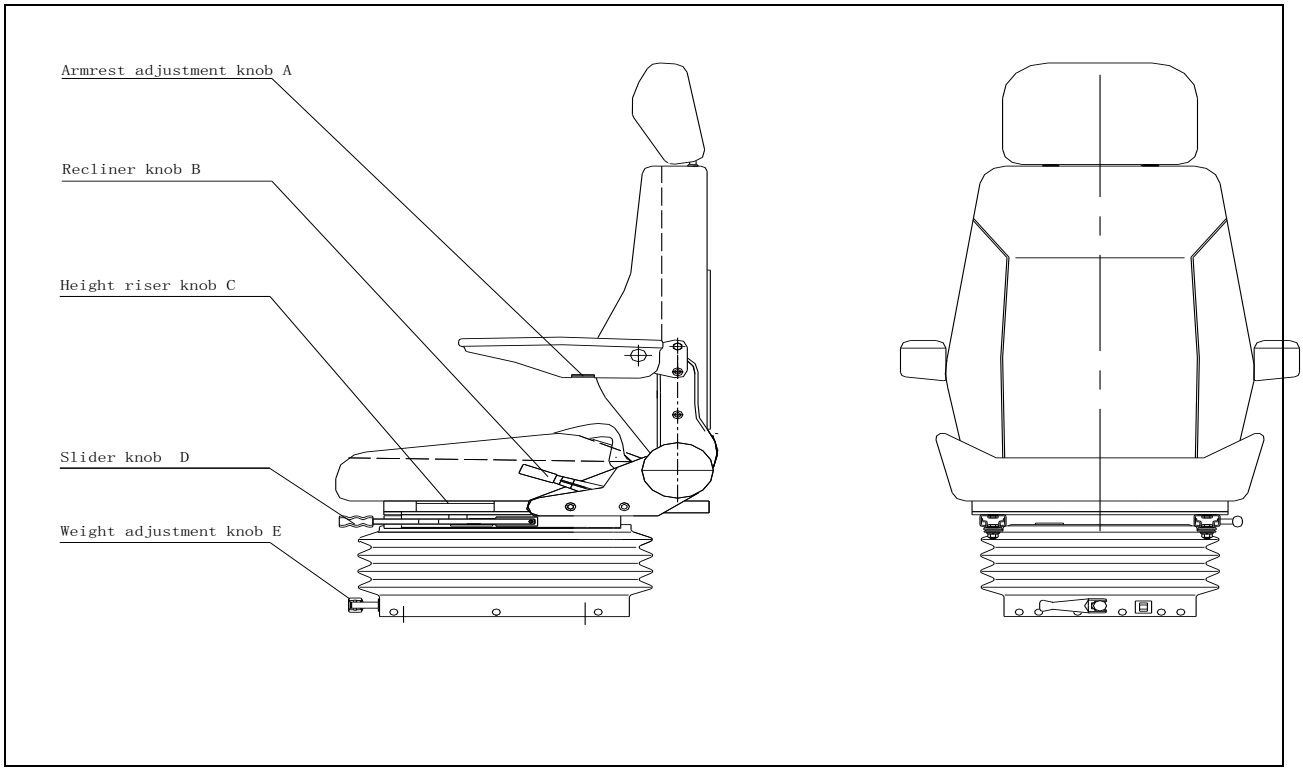
2.4.4 Radio Mute Button Switch

The radio was playing, mute function can be achieved by operating the buttons on the left handle and maintain, operate the button again will restore the current play position.

Repetitive operation is mute and cycled play, show as the right figure.

Mute button of left handle

2.5 SEAT ADJUSTMENT



SWE series cab seat is a specially designed deluxe driver seat for construction machineries. The backrest and cushion are both designed according to the body engineering ergonomics, which offers the driver the most comfort. The seat is assembled with a suspension device, which can help to reduce harmful vibration effectively and ease the fatigue of the driver.

Technical Features

(1) headrest adjustment: imposed the upward force the headrest can make the head pillow to proper height.

(2) backrest adjustment: lightly back seat backrest t, upward rotate handle, push backrest to the proper position with the back, loosen the handle, the backrest can be locked.

(3)damping adjustment: rotate handwheel, according to road conditions and driver weight to preset force to the

needed numerical value. Do not adjust white pointers to the position which is less than 40 to more than 130.
(4) the level adjustment: upward move rod which is under the seat, the seat forward (back) to the proper position, loosen the tie rod, the seat can be locked.

Caution

(1) Only adjust the seat when the driver is in safety condition

(2) For slider and recliner adjustment, please make sure the knob is in the proper position; only when the adjustment mechanism parts are separate, then do the adjustment.After all the adjustments, please make sure every knob stays in the proper position and every part is locked.

2.6 AIR CONDITIONER

Air conditioner (As figure 2.6), functions are as below:

Wind speed adjustment:

Screw knob A to adjust wind speed.

Temperature adjustment:

Screw knob B to adjust temperature.

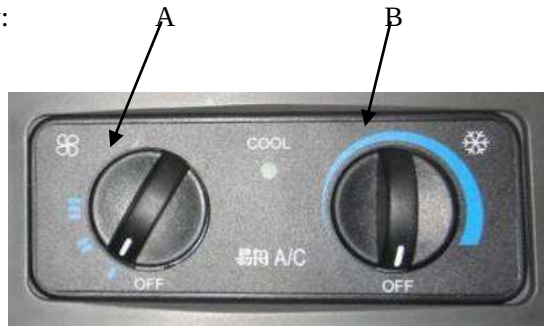


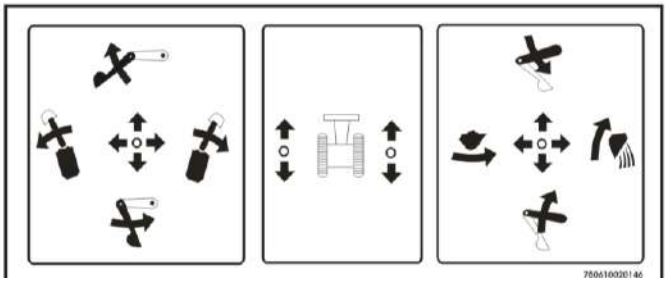
Figure 2.6

CAUTION

- **After shut off air conditioner, it must be 5 or more minutes later to permit starting air conditioner again.**
- **It had better use the air conditioner when the engine operates.**

2.7 PILOT CONTROL JOYSTICK

Operation marks (As figure 2.7.1):



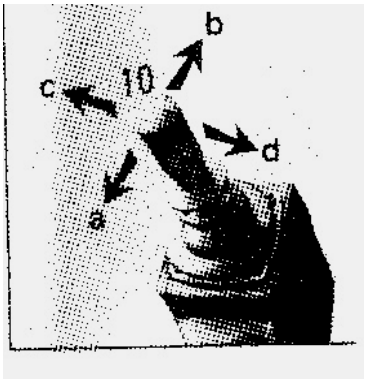


Figure 2.7.1

The machine equipped with left and right pilot control joystick.

The right pilot joystick controls following movements (As figure 2.7.2):

a —— lift boom

b —— lower boom

c —— backhole loading, or grab bucket rotate clockwise

d ——backhole dumping, or grab bucket rotate anticlockwise

The left pilot joystick controls following movements

e—— rotate upper carriage anticlockwise

f —— rotate downcarriage clockwise

g —— extend arm

h —— retract arm

Composite movements can be achieved by two joysticks' assorted operation.

Also, horn button and breaker hammer button are equipped on joysticks.

2.8 THROTTLE CONTROL

SWE50B/SWE50F/SWE60B/SWE60F accelerograph control

SWE50B/SWE50F/SWE60B/SWE60F engine accelerograph rotary knob adjusts engine rev (As figure 2.8.1). When accelerograph rotary knob is lifted to the top, engine runs at high idle speed; lower it to the bottom, engine runs at low idle speed(while lifting and lowering, the red knob should be pressed down at the same time), adjust accelerograph between upmost and bottommost to control engine revs, and also you can screw black hand wheel to adjust accelerograph imperceptibly.

Accelerograph rotary knob

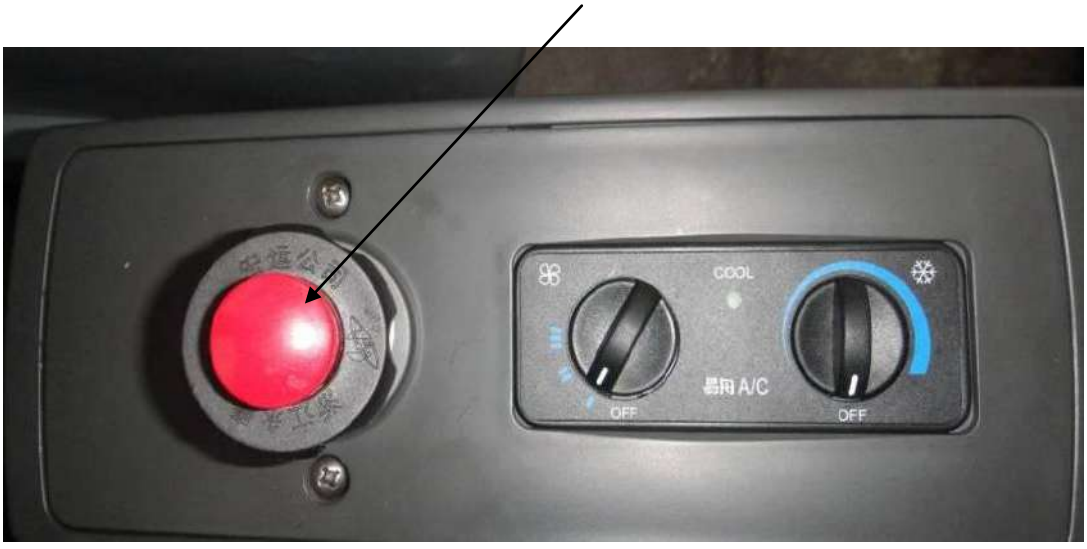


Figure 2.8

Engine throttle push rod is used to adjust engine revs (Figure2.8), operate push pole can select different revs in different shifts, forward push pole increase rev of engine, backward push pole decrease rev of engine.

Figure 2.8.2

SWE70B/SWE70F/SWE80B/SWE80F/SWE90UB/SWE90UF throttle control

Engine throttle rotary knob is used to adjust engine revs (Figure2.8.2). operate throttle knob can choose different revs of different shifts, counter clockwise rotation can increase engine revs, clockwise rotation decrease engine revs.

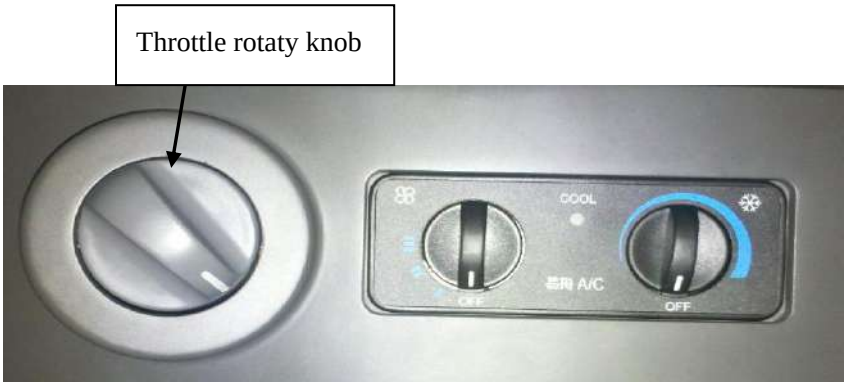


Figure 2.8.3

2.9 CAB TOPLIGHT (OPTIONAL）

2.10 PLATFORM LIGHT

2.11 FRONT WINDOW

Front window of the cabin can easily be opened for maintenance and leaving purpose. Open the fastening of front window; push the glass window upwards and backwards to the scheduled position; to fasten glass window (As figure 2.11).

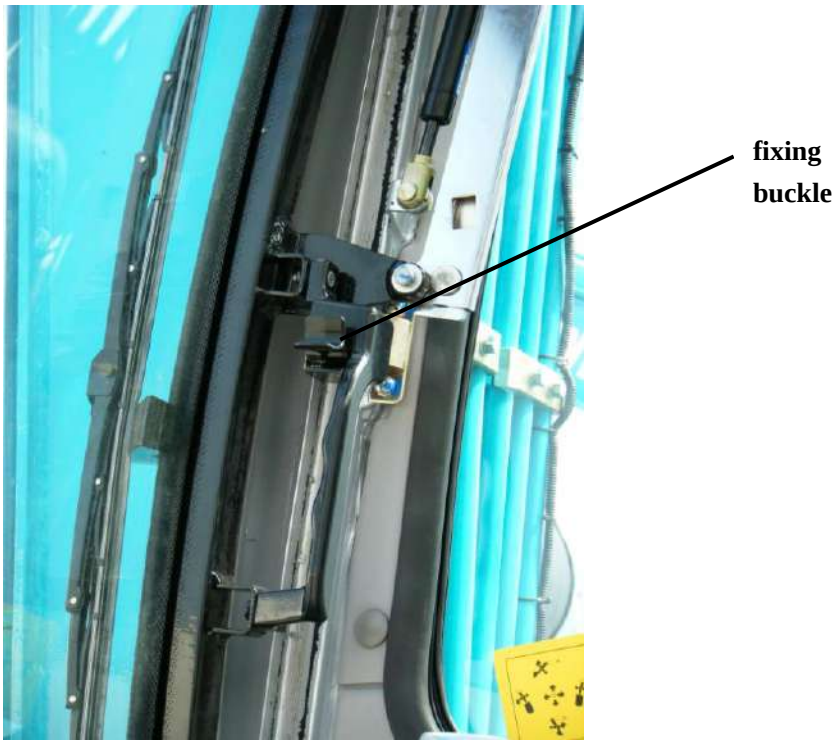


Figure 2.11

2.12 WIND HOOD AND UPPER-COVER

Figure 2.12

Wind hood:

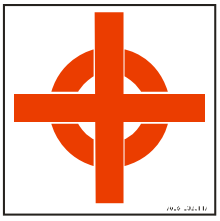
The engine should be equipped with air ducting hood to prevent foreign materials from being reeled into fan which disturbs the normal work of fan. On the other hand, the assembly of air ducting hood can prevent accident caused by carelessly putting hand into the fan (As figure 2.12). It is equipped with mounting plate on both left and right and is connected with the water tank.

Upper-cover

The upper-cover can protect the hydraulic components, electric circuit in the interior of the excavator and ensures the beautiful appearance. It is fixed on the platform and also protects engine. Upper-cover can be opened at the rear position of the machine, its convenient for daily maintenant and exam.

2.13 LABELS

Gravity center label：



Traction hook label：

"No step on" label

3. MACHINE OPERATION

3.1 MACHINE WORKING ENVIRONMENT

Machine adjustment is not needed below the altitude of 2300m and temperature above -30℃. And you should fully preheat machine before starting it. You can run it all day even on rainy or snowy days but have to obey corresponding safe operation instructions.

CAUTION

- **The manual only applies to normal working conditions, when the machine works in other potentially dangerous conditions, such as conditions with inflammable, explosive materials, dust and poisonous chemical materials, you should obey corresponding safe operation instructions and regulations.**
- **When the machine is used with other purposes not in this manual, you have to get the consent of Sunward or its agents and obey relative regulations in the place where the machine is used.**

3.2 RUNNING-IN OPERATION

CAUTION

Pay special attention to the first 50 hours running until be familiar with the sound and feelings of new machine.

(1) Watch engine running carefully

Important:

Take care of machine in initial 50 hours, till you fully familiar with the sound and feeling of machine.

- Limit the engine power within the range of 80% full load and operate the excavator.
- Avoid engine exceeding idle.
- Check the indicator light and display usually during running.

(2) Every 8 hours operation or everyday

- Carry out the 8 hours operation or everyday maintenance. (refer to maintenance guide.....eight hours)
- Pay attention to the liquids leakage.
- In the first 100 hours or working in mud, lubricate the pivot of working instrument after every 8 hours operation.

(3) After first 50 hours operation

- Carry out every 50 hours maintenance. (refer to maintenance guide.....fifty hours)

- Check the torque of detectable fastener. (refer to the torque specifications of fastener in the maintenance part)

(4) After first 100 hours operation

Carry out every 50 hours and 100 hours maintenance. (refer to maintenance guide.....fifty hours and 100 hours)

3.3 ENGINE OPERATION

Daily inspection before operation (As figure 3.3.1)

(1) Electrical system

Check whether there are abraded or cracked wire and slack connector or not, and check whether the light can be turned on or off normally or not.

(2) Boom, arm, bucket, dozer blade, sheet metal, track shoe

Check whether there are curving, damaged, and lost parts or not.

(3) Fastener

Check whether there are slack or lost parts or not.

(4) Fuel system

Drain the water and sediment in the fuel tank.

(5) Hydraulic system

Figure 3.3.1

Check the leakage, hose twist, the abrasion between pipe and hose or other parts.

(6) Lubrication

Check the appointed lubrication points listed in the periodic maintenance table.

(7) Protection device

Check shield and mud shield.

(8) Safety

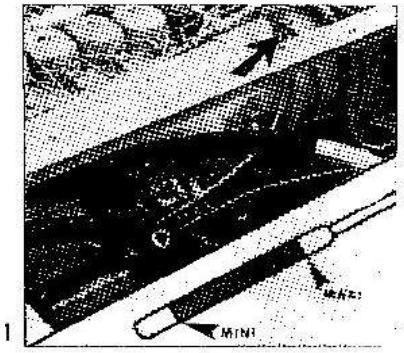


Figure 3.3.2

Keep all people away from machine, and remove barrier.

Inspection before starting engine

Place the machine on a horizontal ground, check the engine oil level (stop engine, the engine oil will return to the tank 15 minutes later)

The oil level of dipstick should be on the range of "MIN" and "MAX" mark (As figure 3.3.2).If oil level is too low, please screw oil filling lip (2) to fill oil.

The way of using and maintenance engine please refer to "Diesel engine oil maintenance and usage manual".

Electrical device

Check all switch, all light indicator, safety warning device, battery electrolyte acidity, and fuses.

Air filter

When the indicator light on the meter flickers, which means the inhaling resistance reaching the maximum value, the filter element shoule be maintained or replaced.

Oil level in hydraulic oil tank

Hydraulic oil filling label(As figure 3.3.3)：

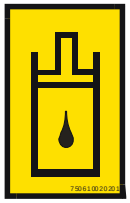
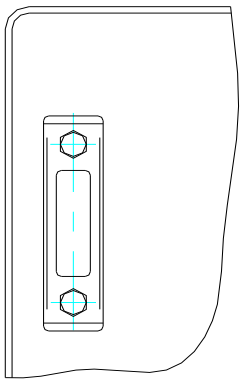


Figure 3.3.3

【**Important**】Following notes for adding oil to hydraulic oil tank (As figure 3.3.5):



(1) Place machine on horizontal ground and retract all hydraulic cylinders, the oil level doesn't allow it to exceed MAX mark.

(2) Similarly, when all hydraulic cylinders extend, the oil level should be not lower than the MIN mark.

(3) It should choose recommended oil according to the Lubricant List.

(4) All filled hydraulic oil must pass through returning oil filter.

Engine staring and stopping label (As figure 3.3.7)：

Figure 3.3.7

Before starting engine (As figure 3.3.9)

(1) Keep pilot valve control lever locked and keep pilot handle & travel pole neutral.Turn on switch of power, operator sits in cab.

(2) Turn key switch to ON position, all indicator lights except engine hour meter and LCD module and buzzer sounded at the same time, finished self inspection after 2 seconds, the monitor system is on normal working condition.

Start the engine

a) Keep pilot valve control lever locked and keep pilot handle & travel pole neutral. Operator sits on seat.

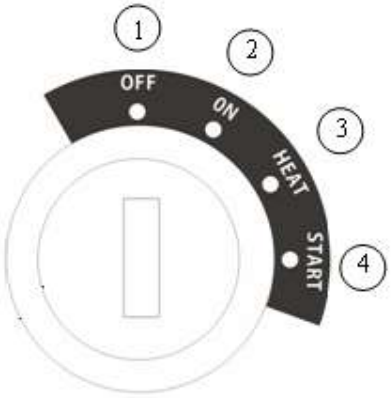


Figure 3.3.9

b) Turn key switch to ON position.

c) Beep horn to warn surrounding people.

d) Place accelerograph pull-rod to the place which is higher than lowest idle speed.

e) Start engine by turning key switch clockwise to START position, release key, the switch will return ON position.

【Important】 In order to avoid damage of starter, never operate motor starter for 5 seconds or more every time. If the engine can't start, turn the key switch to OFF position and wait at least 30 seconds, then try again. After wrong start, the engine should be stopped completely, then you can turn key switch, otherwise it may damage starter (As figure 3.3.7).

Start engine in cold weather

(1) Turn the ignition key to ON position.

(2) Turn the key to START position and hold for few seconds to lubricate the hydraulic pump before enging starts.

(3) Turn the key anticlockwise to HEAT position, the indicator light will on after 30 seconds which means the preheating is finished.

(4) When the preheating indicator light is on, start the engine as above mentioned methods.

【**Important**】If there has fault in monitor, shut down the engine at once and check the reason.

Adjust engine rev

Engine rev can be adjusted by accelerograph knob which is in the left operation box of cab,When accelerograph knob lifted to upmost, engine runs at full load; lower knob to bottommost, engine runs at minimum load; adjust accelerograph between upmost and bottommost to adjust engine rev, and also you can screw handle to adjust accelerograph imperceptibly.

Stop engine

【**Important**】 Don't stop engine directly when it is full loaded, it should stop engine after 5 minutes minimum loaded operation to unload the heat load and avoid possible damage to engine. If engine stop with load, it should remove load and start engine at once.Before with loading, please run 1 minute with half of the speed.

a) Place machine to the flat ground.

b) Lower the bucket to ground.

c) Place the accelerograph knob to minimum load position and run engine for about 5 minutes to make engine cool down.

d) Rotate key switch to 'OFF'position and close engine, then take out the key..

e) Place pilot control lever to LOCK positio

Use assistant battery

CAUT I ON

1. When battery is used or charged, mixed gas which is made up of oxygen and hydrogen gas will be discharged from exhaust hole.Avoid flame or spark close to battery. Electricize battery at the well-ventilated area. Place the machine on dry & hard ground, not on steel plate, otherwise it may cause spark accidently. Never connect anode and cathode directly, otherwise it will cause short circuit.(As figure 3.3.12)

2. When start engine, the operator must sit on the operation seat to control machine.

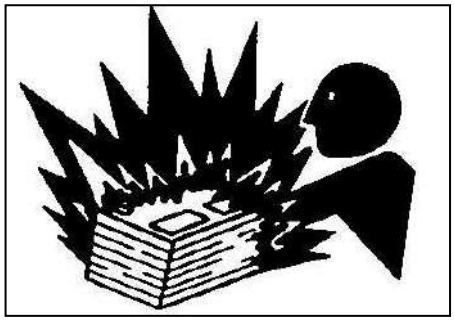


Figure 3.3.12

【**Important**】Earth the 12V cathode (-), and only use 12V assistant battery.

When the battery exhaust, you can start engine with assistant battery.

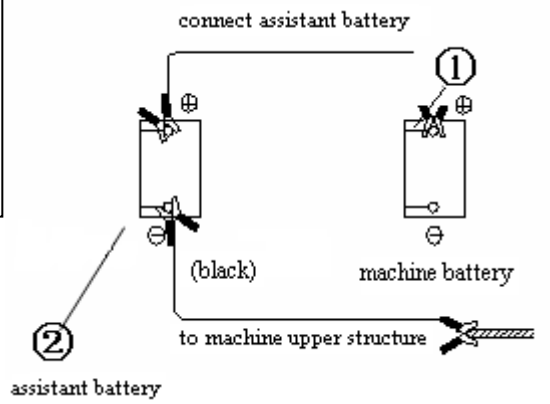


Figure 3.3.13

- Connect assistant battery(As figure 3.3.13)

- ✧ Stop engine which equipped with assistant battery.
- ✧ Connect one end of red wire ① with battery anode (+), and connect the other end with assistant battery anode (+).
- ✧ Connect one end of black wire ② with cathode of assistant battery, and connect the other end with excavator framework as earthing connection. When connect with excavator framework, keep as far as away from the battery connection wire end.
- ✧ Start the engine.

- Separate assistant battery
  - ✧ First, break black cathode (-) wire ② away from framework..
  - ✧ Disjoin the other end of black cathode (-) wire ② from assistant battery.
  - ✧ Disjoin red anode (+) wire ① from assistant battery.
  - ✧ Disjoin red anode (+) wire ① from machine battery.

3.4 TRAVELLING CONTROL

Travel with foot pedal

(1) Straight travel: Step on 2 pedals forward at the same time.

(2) Straight back: Step on 2 pedals backward at the same time.

（As figure 3.4.1）

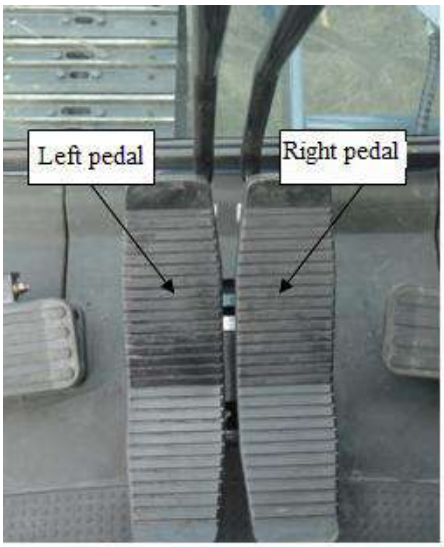


Figure3.4.1

(3) Turning in one point

a) Turn left (As figure 3.4.2): Treadle right pedal forward and treadle left pedal downwards.

Figure 3.4.2

b) Turn right (As figure 3.4.3): Treadle right pedal downwards and treadle left pedal forward.

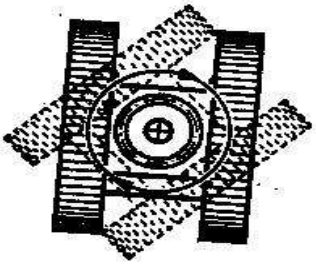


Figure 3.4.3

Turning with one side crawler (As figure 3.4.4)

Turn left: treadle right pedal 2 forward.

Turn right: treadle left pedal 1 forward.

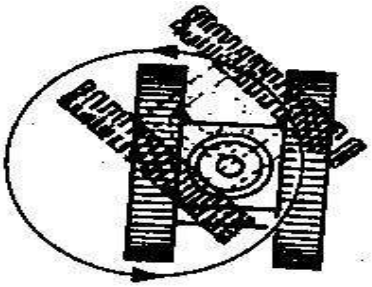


Figure 3.4.4

In order to protect travel mechanism, it should avoid turning while backing.

Travel with handle control

If need the machine hairlike traveling, you can insert two attached handles to carry out hand control. This method is safe and reliable and fit for loading and unloading the machine to trailer (As figure 3.4.5).

(1) Straight travel: Push 2 handles forward at the same time. (Figure. 3.4.5

(2) Straight back: Pull 2 handles backward at the same time. (Figure. 3.4.5)

(3) Turning in one point

Left turning (figure 3.4.2): Push right handle forward and pull left handle backward.

Right turning (figure 3.4.3): Pull right handle backward and push left handle forward.

(4) Turning with one side crawler(figure 3.4.4)

Left turning: push right handle forward.

Right turning: push left handle forward.

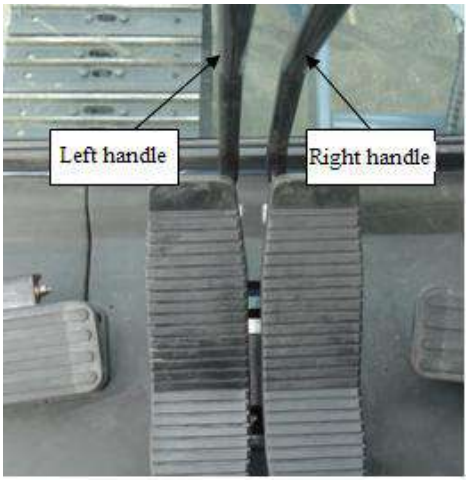
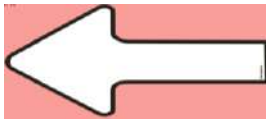


Figure 3.4.5

In order to protect travel mechanism, it should avoid turning while backing.

Travel direction label: 

Travel speed

During the machine traveling, press high/low speed switch on control panel, it can achieve the shift of travel motor high/low speed, then the machine can travel at high or low speed (As figure 3.4.6).

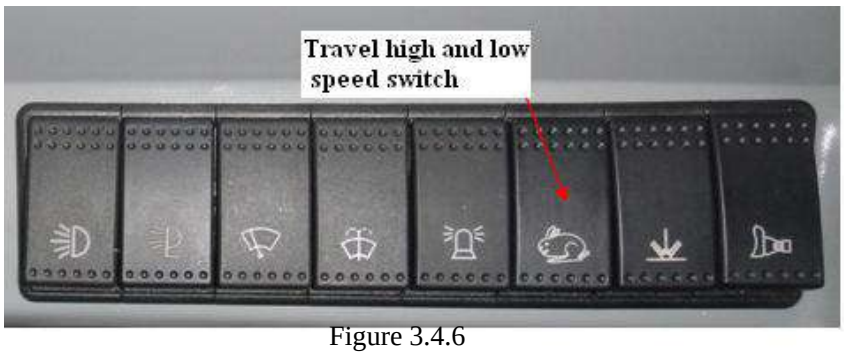


Figure 3.4.6

Travel brake

Release travel pedal or travel handle, it will return to natural position automatically, the machine stops traveling.

Key points of travelling

(1) Arm and bucket cylinder must be extended completely to place the working device on minimum radius position, the bucket will be about 0.5m to the ground.

(2) Lift dozer blade to its zenith.

(3) Choose plane road to travel as much as possible. It should travel straight when traveling or turning, and also turn large bend, avoid turing blind bend. When turn in one point at confined area, it should operate gently.

(4) When travel at badlands or uneven carpolite road, it should reduce engine rev and travel at about 1.5km/h to reduce the vibration.

(5) Avoid back traveling to prevent crawler parts damaging prematurely.

(6) If the excavator can't travel for getting into miriness, you can extend arm and place bucket to ground (as figure) to lift one side of crawler, then turn the lifted crawler to clean out the bedload. In order to reduce the force enduring of boom and arm, the angle between boom and arm should be in the range of 90°--110°(As figure 3.4.7)

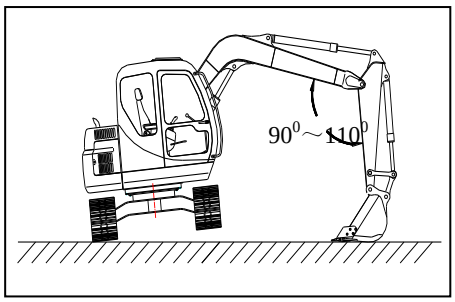


Figure 3.4.7

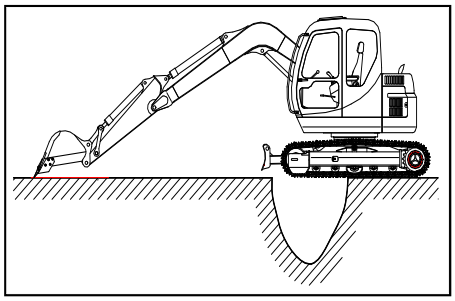


Figure 3.4.8

(7) When the machine gets into wallow or passing raceway, you can use arm and boom to help the machine passing (As figure 3.4.8)

(8) Extend arm when travel on slope, lower bucket to 0.5m to ground (As figure 3.4.9)Travel downgrade slowly by controlling engine accelerograph and adjusting pilot valve imperceptibly to prevent sliding and accident. If the machine slides on slope, put down bucket for brake purpose. Pay special attention when the machine climbs slope, if the engine stops, it should put down bucket to

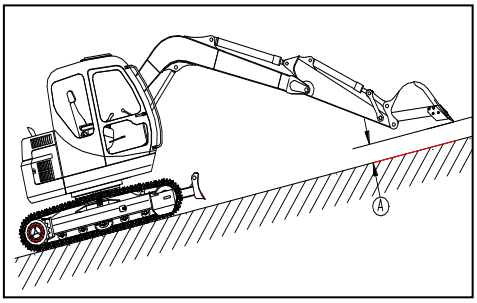
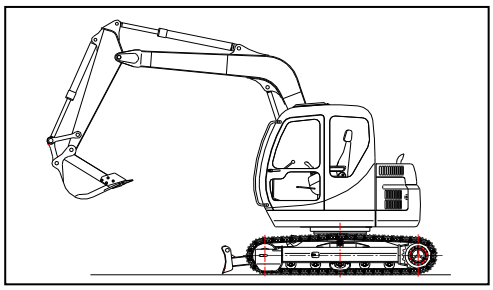


Figure 3.4.9

brake at once, make every control lever to neutral position, then start engine again.



3.5 EXCAVATION

working condition

When dig lengthways with backhoe, it should make the drive wheel backward and guide wheel forward. (As figure 3.5.1), pilot lock turn to unlock position.

Figure 3.5.2

Figure 3.5.1

Pilot handles control (As figure 3.5.2)

3 — Left pilot handle

10 — Right pilot handle

Control with right pilot handle

Right figure 3.5.3 is the obverse view of right pilot handle (when operator sits on the seat). The 4 movements of handle can make the excavator moves as follows.

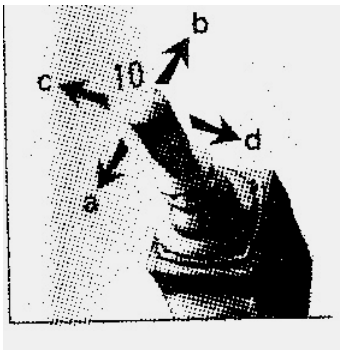


Figure 3.5.3

a —— Raise boom

b —— Lower boom

c —— backhoe load, or grab bucket rotate clockwise

d —— backhoe dump, or grab bucket rotate anticlockwise

Control with left pilot handle

Right figure is the obverse view of left pilot handle (when operator sits on the seat Figure3.5.4). The 4 movements of handle can make the excavator move as follows.

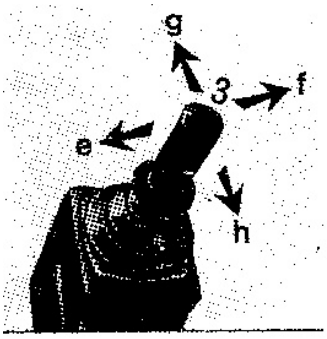


Figure 3.5.4

e ——upper structure slew anticlockwise.

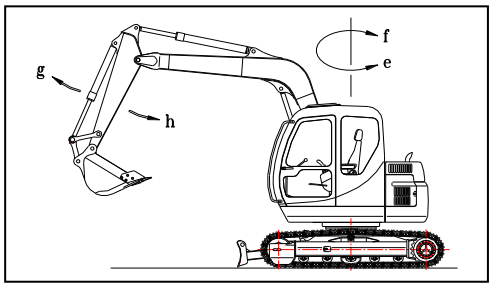
f ——upper structure slew clockwise.

g —— Extend arm

h —— Retract arm

Composite movement of excavator

(1) When the machine slew, you can operate the composite movement of boom and bucket.



(2) It can operate as follows: bucket digging while arm flexing; arm digging while lowering boom, etc.

(3) Besides the co-operation between right and left handle, pull either of handles to any diagonal orientation (45° direction), it can achieve the adjacent 2 composite movements.

Slewing platform brake

Release slewing control handle, return it to neutral position, it will bring sufficient brake power to brake platform. And reverse handle operation can bring more brake torque.

Attention for excavation

(1) Operator must wear safety helmet and work clothes, make sure the safety of working area, then start machine to work.

(2) During digging work, the dozer blade should be placed on ground.

(3) During excavation, especially deep digging work, pay attention to avoid bucket teeth colliding with dozer blade, and also avoid boom cylinder colliding with track shoe.

(4) Other people are not permitted to stand on the machine or within the range of 8m away from working radius. When begin to work or transport with full load, operator should ring horn to warn.

(5) Bucket should dig along the cutting track and avoid digging hard earth constrainedly, otherwise it will cause the hydraulic oil overheated.

(6) During work, do your best to avoid pulling the handle to the end, otherwise it will cause hydraulic oil overheated and damaging components.

(7) Not allow slewing if bucket doesn't leave working face.

(8) It allows using arm and bucket to impel or level off rideau, but never operate side of bucket to do that.

(9) When work at swampy ground (especially on rainy day), the excavator must keep a proper distance away from working face to prevent collapse.

(10) After stop machine, it should shut off all switches of control panel, shut off electric power, and lock cabin.

(11) During digging work, avoid overload work to reduce energy consumption and hydraulic oil temperature.

(12) During digging work, pay attention to the cylinder stroke end, avoid using baffle of boom, arm, and bucket to prolong the lifetime of framework.

(13) If the productivity can satisfy the working demand, in order to prolong engine lifetime and keep low noise running, try your best not to run at maximum accelerograph, the best rev of engine should be 1600-1800 r/min.

(14) Before every shift, according to the rules, inject grease to all reaming connections through grease nozzles until the grease overflow. Otherwise it will cause axle and sleeves damaged.

3.6 EXCAVATOR PARKING

(1) Place the excavator on a horizontal ground.

(2) Lower the bucket to ground.

(3) Place accelerograph handle on minimum load position for 5 minutes.

(4) Turn ignition key to "OFF" position, and take out key.

(5) Cut off the main power switch.

(6) Set the pilot control lever to LOCK position.

【Important】

In order to protect the electric parts in cabin, you should close top window and cabin door when you park the excavator.

(7) Lock all doors and boxes.

【Important】In cold weather, the excavator should be parked on hard ground to avoid crawler and ground congealing together. If above congealment happened accidentally, please lift crawler by using boom, move excavator carefully to avoid damaging drive wheels.

Operation on swampy ground

(1) Try your best to avoid traveling on swampy ground.

(2) If the machine work on very soft ground or be stuck, it need clean crawler frame.

(3) Slew upper structure 90° and lower bucket to lift one side of crawler off ground, keep the angle between boom and arm in the range of 90°--110° (As figure 3.5.5), and place the bucket arc on the ground.

(4) Turn the lifted crawler to eliminate dirt.

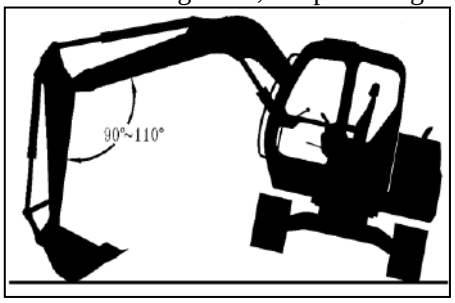


Figure 3.6.8

Lift one side of crawler by using boom and arm

Attentions:

(a) Keep the angle between boom and arm in the range of 90°--110°,

and place the bucket arc on ground.

(b) Slew upper structure 90° and lower bucket to lift one side of crawler off ground. Don't dig into the ground with bucket teeth when the machine is in backhoe condition.

(c) Place chock under the framework to support machine.(Figure 3.6.8)

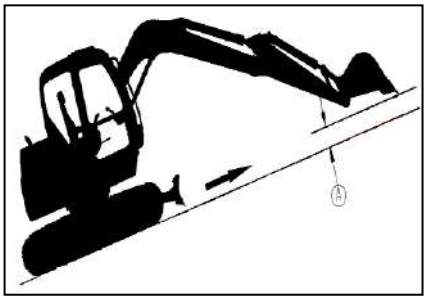


Figure 3.6.9

Avoid tilting

Avoid transverse traveling on slope. When the machine travels on slope, the traveling direction should be accordant with the gradient. When upgrade and downgrade, keep the bucket pointing to the traveling direction and lifting 200-300mm to the ground (As figure 3.6.9). Lower bucket at once if the machine is skidding or instable. (As figure 3.6.10).When the machine slew with heavy load, it should operate carefully and operate with low slewing speed.

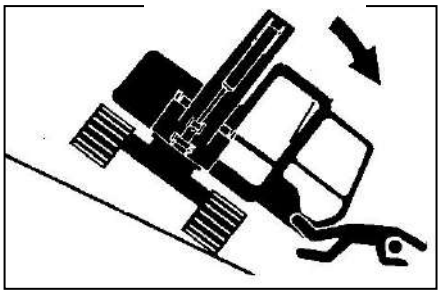


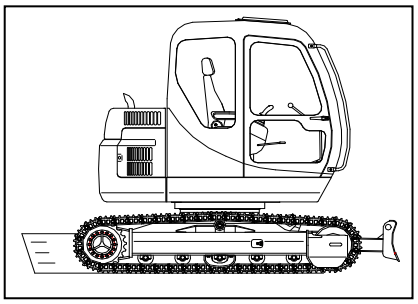
Figure 3.6.10

WARNING

Don't slewing on slope.

Operate in water or mud

You should note following information when operate in water or mud:



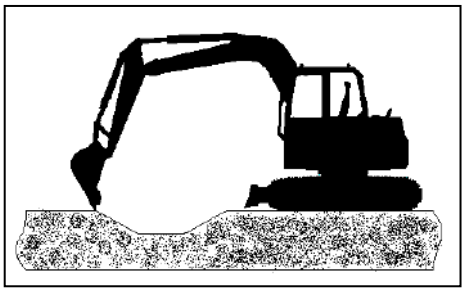
(1) The working area should be sufficient hard to avoid excavator going down.

(2) The water flow should be slow.

(3) Undercarriage immerged height doesn't allow exceeding chain support wheel.

(4) Slewing support, inner gear ring, and slewing connector won't be allowed immerging.

(5) When operate in these conditions, please check the excavator position usually.



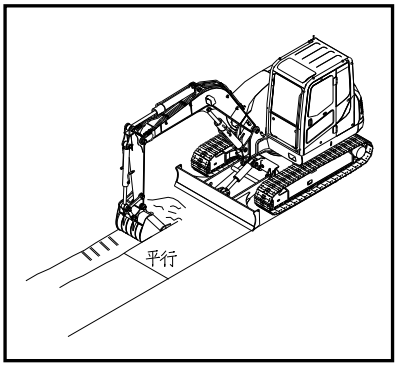
Backhoe operation

(1) Place the bucket teeth on ground while the angle between bucket bottom and ground is 45°.

(2) Apply arm to be the main digging force, pull bucket to the machine direction.

(3) When dirt adhered on the bucket, remove arm and (or) bucket quickly to throw the dirt.

(4) When dig straight trench, place crawler parallel to the trench. After dig to required depth, remove machine to continue digging.

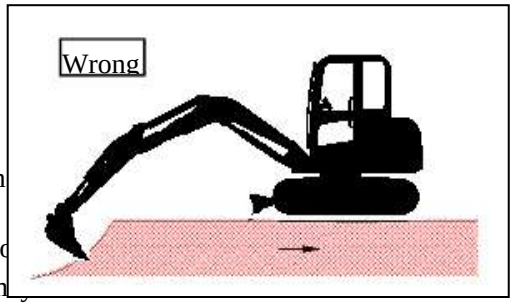


【Important】

- When lower boom, you should avoid stopping it suddenly. Otherwise the impact load may damage excavator (As figure 3.5.10).
- When operate arm, in order to prevent damaging hydraulic cylinder, it should avoid lowering hydraulic cylinder to the bottom.
- Avoid bucket colliding with crawler.
- When digging deep trench, it should avoid boom or arm cylinder hose impacting with ground.

Operation on flat ground

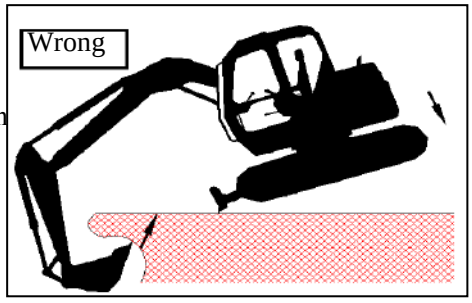
【Important】



- Do not use the bucket for flat operation excessively.
- Do not pull the bucket by travelling for flat operation
- Do not use the bucket by rotation for flat operatic especially there's a large obstacle, otherwise it m damage the machine.
- Do not pull or push the soil by the bucket whil travelling.

- Press F3 on the meter to choose flat ground mode while th finishing work is needed.
- Rotate the bucket and place it to the position of a little fro of the arm.
- Retract it while lifting th boom slowly, once the arm move beyond the vertical position, lower the boom to keep th bucket move in horizontal.
- Operate the boom, arm and bucket at the same time to mak the flat operation more precise.
-

Prevent collapse



(1) Place traveling motor to the rear of machine to work.

(2) Don't place machine at the edge of trench or diggin area.

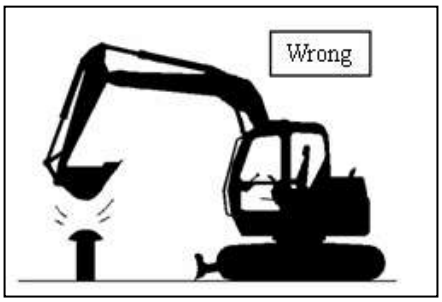
(3) Don't digging the earth under the machine.

Operation tips

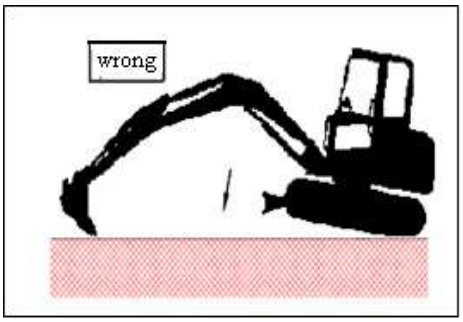
(1) In digging work, don't let bucket collide with crawler.

(2) Try your best to place the excavator on horizontal ground.

(3) Don't operate bucket as hammer or piling machine. Don't slew machine to remove blocks or to break up wall.

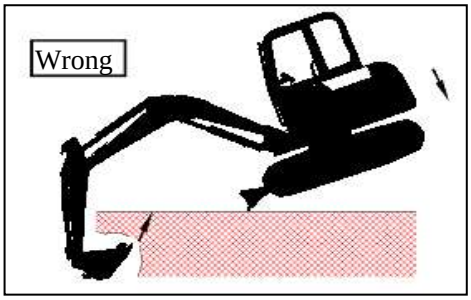


【**Important**】**:** In order to prevent damaging hydraulic cylinder, don't allow bucket cylinder to collide with ground or bucket tamping when the bucket cylinder is fully extended (bucket fully retracted).



Adjust the digging length and depth every time to ensure every digging is fully loaded. In order to increase throughput, full load should be the first important goal, and then the working rate should be.

Don't try to extend arm fully and drop bucket, penetrate ground with bucket teeth to dig up rocks. These will cause serious damage of machine.



Once trench excavated, it can dig up rocks by raise bucket from earth.

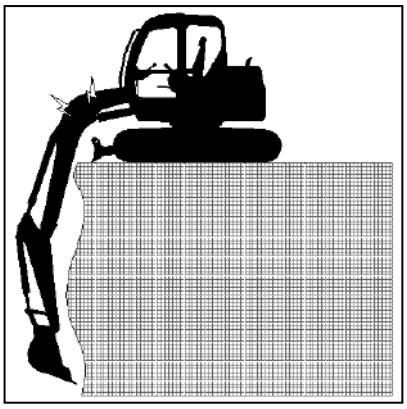
Don't make bucket bearing side load. For example, don't level materials by swinging bucket or side impact objects with bucket.

Prevent misuse of machine

Don't treat traveling movement as accessional digging force. Otherwise it will damage the machine.

Don't raise rear of machine, and treat the weight of machine as accessional digging force. Otherwise it will damage the machine.

Dozer blade operation label:



Pay attention to the dozer blade position

(1) When dozer blade is extended, it may collide with boom cylinder or bucket, please pay attention to it.

(2) When the excavator carries out deep digging

work, place dozer blade at rear to guarantee safety.

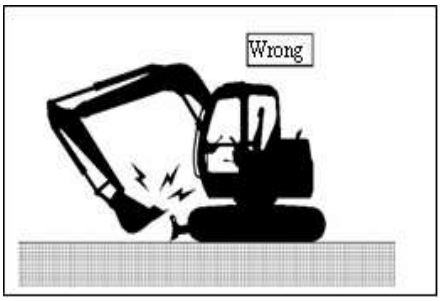
Prevention measurement for dozer blade

(1) Don't use dozer blade to dig, otherwise it will damage dozer blade or crawler system.

(2) Dozer blade can't support large or unstable barycenter objects, otherwise it will damage dozer blade or crawler system.

(3) When the machine traveling, dozer blade can't draw any object, otherwise it will damage dozer blade or crawler system.

(4) When prop up machine with dozer blade, the ground should be plane to ensure dozer blade touching ground stably.

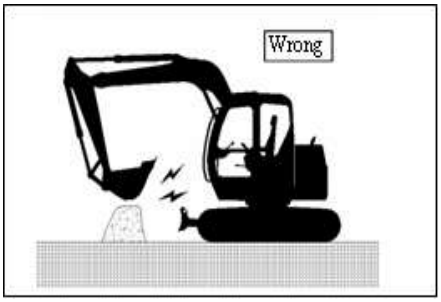


Be careful when retract foreside work device

Don't allow the bucket to collide with dozer blade.

Don't allow dozer blade to touch roadblock

Don't allow dozer blade to touch roadblock, otherwise dozer blade, cylinder, or other components will be damaged.



3.7 LIFTING WORK

Lifting hook mark (As figure 3.7.1):

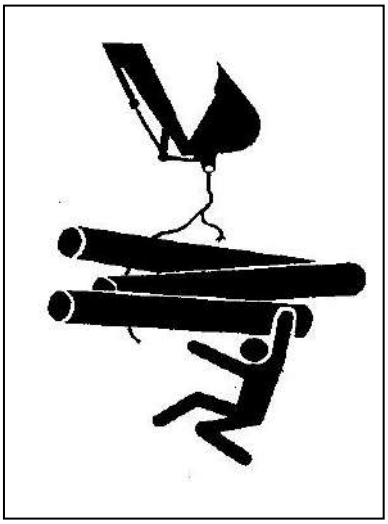


Figure 3.7.2

Attention:

- **It must follow all safety regulations when the machine lifts objects.**
- **Don't use damaged chain, wire rope, or cord in lifting work, or GBH may occur (As figure 3.7.2).**
- **Don't move the load suddenly. Don't move load on the top of human beings. Don't permit everybody adjacent to the load.**
- **Ensure everybody away from lifted or tightwire-tied and on the ground load, until the chocks support the load or the load has been stably placed on the ground.**
- **Fix upper structure, and make the traveling motor on the rear.**
- **Don't connect sling/chain on the bucket teeth.**

(1) Sling/chain should tightly bind the load down, the workman should glove when bind sling/chain.

(2) Connect sling/chain with bucket lifting ring, curled bucket, and retracted arm.

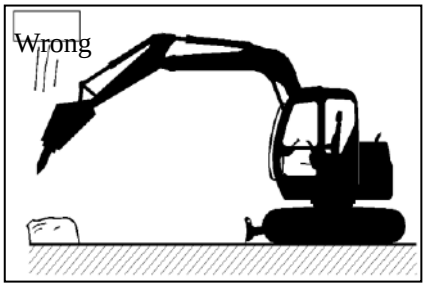
(3) Before starting, it should uniform the hand signal with signalman.

(4) Acquaint with the positions of all workmen in the range of working area.

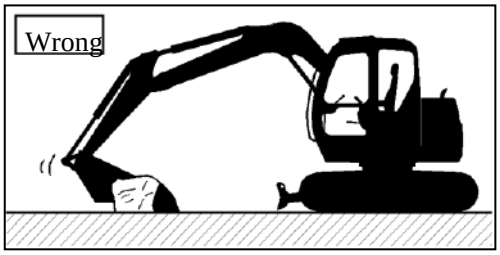
(5) Connect hand rigging on the load and ensure the people pulling hand rigging away from load.

(6) Try to lift the load before normal operation.

- Park the machine beside the load.
- Connect the load on the machine.
- Lift load to 50mm (2in) height to the ground.
- Swing the load to one side.
- Keeping load close with ground, move the load from the side of machine.



(7) Just lift the load to required height.



3.8 HYDRAULIC HAMMER CRUSHER

Hydraulic breaking operation tips-if equipped

Choose correct dimension and weight hydraulic crusher. Consult with your dealer.

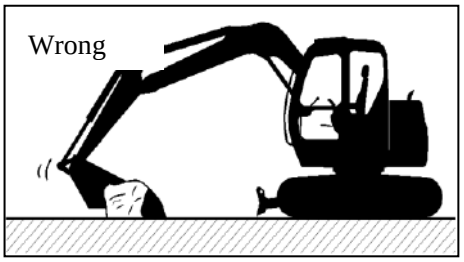
Attentions for hydraulic crusher tubing

(1) When the hydraulic crusher is out of use, cover the pipe end of arm end and fit on plug at the hose end of hydraulic breaker to avoid dirt entering into system.

(2) Ensure stocking cover and plug in tool compartment for maintenance purpose.

(3) Avoid dirt entering into system when change the foreside attachment from bucket to hydraulic breaker.

(4) After connection, check the oil leakage and bolts slack condition.



Before fit hydraulic breaker on the arm, read manual books of machine and hydraulic breaker carefully, and carry out the required confirmation or inspection.

(1) Carry out required inspection before daily operation.

(2) Operate machine slowly, the stability of machine will be decreased because the hydraulic breaker is heavier than the bucket. So, use dozer blade to support and work in front of dozer blade.

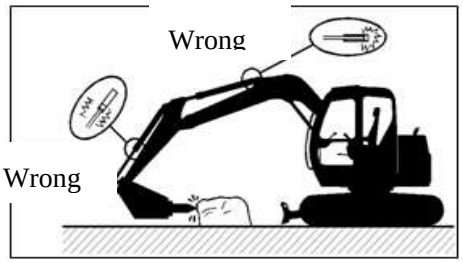


Figure 3.8.2

(3) Avoid hammering work with hydraulic breaker. Never use boom or arm to break objects, otherwise it will damage machine (As figure 3. 8.2).

(4) Don't move objects with hydraulic breaker, otherwise it will damage machine.

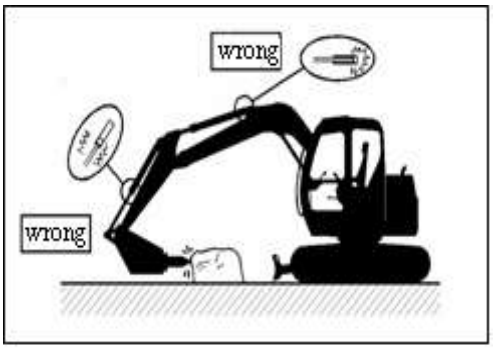


Figure 3. 8.3

(5) Don't operate hydraulic breaker when hydraulic cylinder piston retract or extend totally, avoid damaging hydraulic cylinder or machine (As figure 3.8.3).

(6) If hydraulic breaker hose jumps abnormally, stop operation immediately. The pressure change of breaker accumulator or damaged accumulator will cause unusual hose jump, and damage hydraulic breaker or machine (As figure 3.8.4).

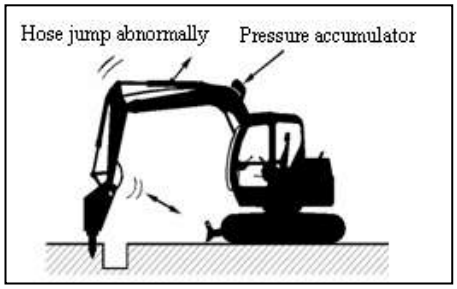


Figure 3.8.4

(7) When retract foreside attachment, don't let the chisel of breaker to touch boom (As figure 3.8.5).

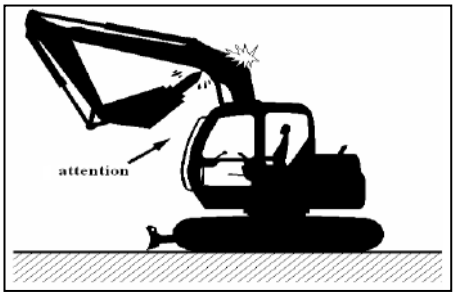


Figure 3.8.5

(8) Don't operate hydraulic breaker in water.

(9) Don't lift objects with hydraulic breaker, otherwise it will cause machine upset and (or) breaker damage (As figure 3.8.6).

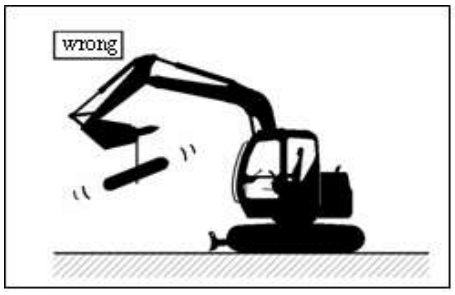


Figure 3.8.6

(10) Don't swing superstructure to the side of machine to operate hydraulic breaker, or the machine will be very instable and thus shorten the lifetime of undercarriage.

Replacement of hydraulic oil and filter core

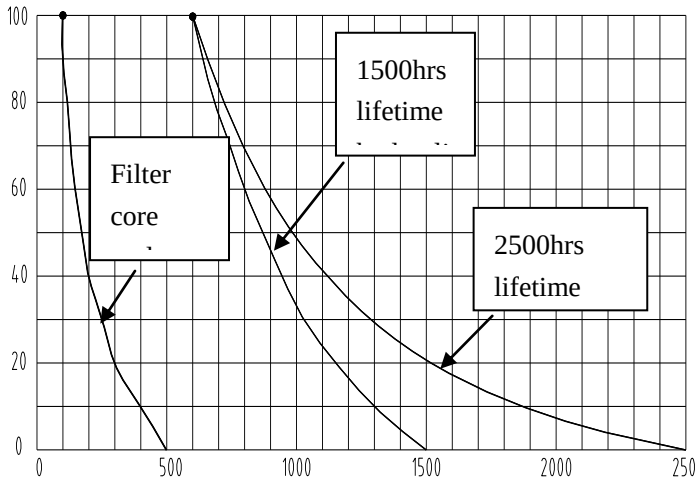
Hydraulic breaker operation will pollute hydraulic system and accelerate aging. You should replace hydraulic oil filter core and hydraulic oil more frequently to avoid damaging hydraulic pump and other hydraulic parts. The recommended replacement interval is as follows.

Replacement (hours)

	Excavator with hydraulic hammer crusher	Excavator with bucket
Hydraulic oil	600★	1500 or 2500
Filter core	100★	500

Note: (1)Number with ★ mark means the interval that all the machine operation time is for hydraulic breaker. For the hydraulic breaker operation time ratio is less than 100%, the replacement interval should be as hereinafter diagram shows.

(2)When the machine operates hydraulic breaker continuously more than 100 hours, replace hydraulic oil filter core.



Hydraulic breaker operation time percentage (%)

Hydraulic crusher operation tips…if equipped

Choose correct dimension and weight hydraulic crusher. Consult with your dealer.

Operate excavator slowly to avoid overturning, and pay attention to following items.

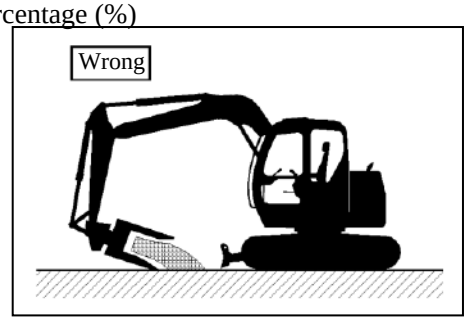


Figure 3.9.7

(1) In order to prevent damaging excavator, don't operate hydraulic crusher when bucket cylinder fully extend or retract (As figure 3.9.7).

(2) Don't swing upper structure to the side of machine to operate hydraulic crusher. In order to prevent excavator overturning, it should carry out crushing only at frontage and rear of machine.

(3) Don't operate hydraulic breaker on slope. It should operate on horizontal ground.

(4) Don't use hydraulic crusher to haul debris.

(5) Hydraulic crusher operation will pollute hydraulic system and accelerate aging. It should replace hydraulic oil filter core and hydraulic oil more frequently to avoid damaging hydraulic pump and other hydraulic parts. The recommended replacement interval is referred to the "Hydraulic breaker operation tips".

(6) When transport excavator, remember to take out hydraulic crusher from the machine, and fit covers or plugs on all hydraulic hoses.

Breaker start-up

(1) Set the breaker/rotation selection switch 7 to the "breaker" position.

(2) Place breaker head at the needed position. Step down the left pedal control plate 1, breaker begins to work, release pedal

control plate when breaker finished the work.

3.9 BOOM SWING

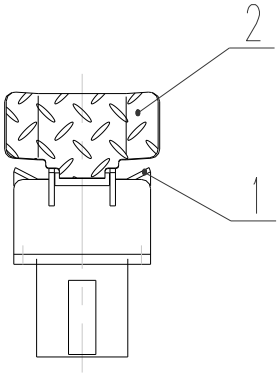
B、F series excavators are equipped with boom swing structure—swing head (as right picture)

Boom swing pedal is located on the right foot of driver, it is used to swing boom, upper structure (cab、engine parts etc.) do not swing, this device is used to excavate ditch or retaining wall.

A. Treadle lower side of pedal, swing boom to right side.

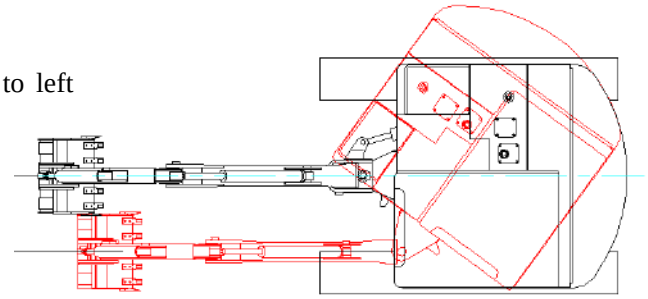
B. Treadle higher side of pedal, swing boom to left side.

When boom swing pedal is out of use, push down pedal 2 and lock pedal 1. When open lock, just pull up the pedal 2.

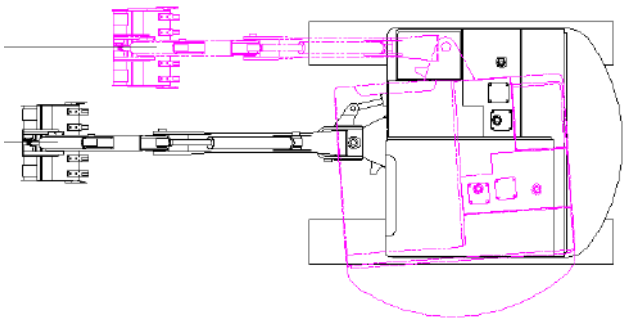


The figures show the boom distance from superstructure centra

A The distance from superstructure central line to left swing.



B The distance from superstructure central line to right swing.



3.10 AIR CONDITIONER OPERATION

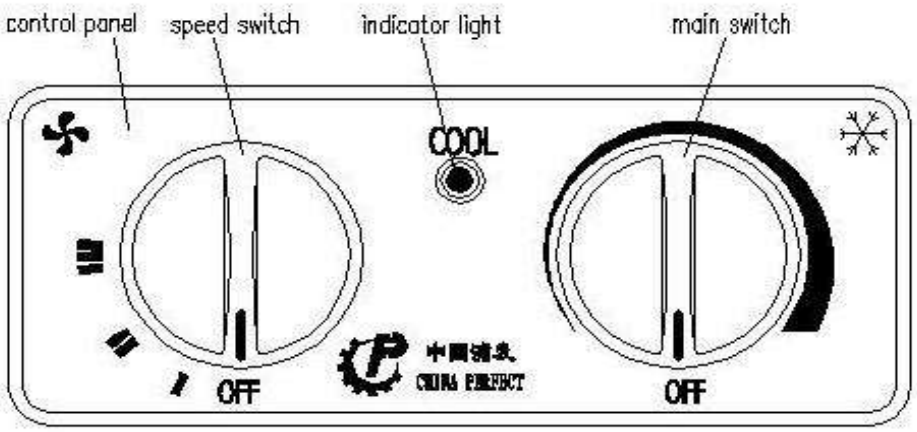


Figure 3.10.1

Basic operations

Aeration operation

(1) As figure 3.10.1 shows, counter-clockwise turn the main switch to OFF.

(2) As figure 3.10.1 shows, clockwise turn the speed switch to I, II or III, you can make low, moderate and high wind speed.

(3) As figure 3.10.3 and 3.10.4, turn the wind exit to a proper direction, you can choose proper wind direction.

(4) As figure 3.10.1 shows, counter-clockwise turn the speed switch to OFF to shut down the whole system.

Refrigeration Operation

(1) Choose proper wind speed and direction according to the “aeration operation”.

(2) As figure 3.10.1 shows, clockwise turn the main switch to a proper position. (Clockwise turn make lower temperature. Turning to the most right makes the lowest temperature. While it is too cool, you can counter-clockwise turn the main switch. Furthermore, you can control the coldness by the wind speed.)

(3) You can get a comfortable environment by controlling the wind speed, wind direction and the coldness.

CAUTION

When it is not too hot, after refrigerating for some time, if you feel too cold, you can counter-clockwise turn the main switch to some proper degree for lower temperature. After some time, if you feel too high wind speed, you can lower it by the wind speed switch.

warm water valve

(4) As figure 3.10.1 shows, turn the main switch and the speed switch to OFF, the whole system will shut down.

Heating Operation

At first, the hot water valve must be opened, then do according “aeration operation”.

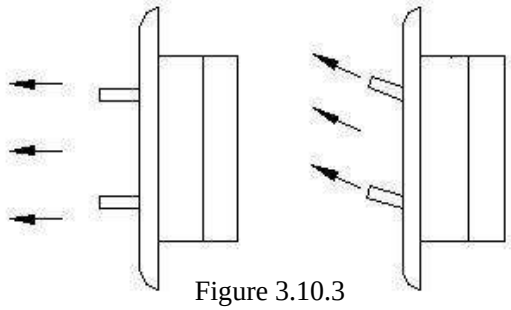


Figure 3.10.3

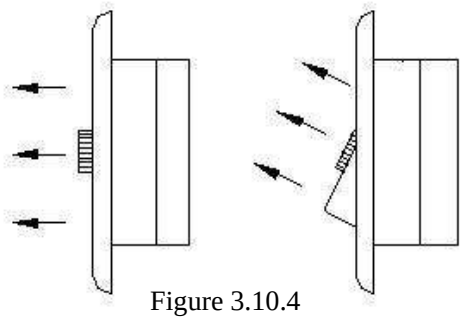


Figure 3.10.4

Special Operation

①. Strong refrigeration operation

When it is very hot, especially a period of time after just turning on the air conditioner, you should choose this operation. That is: choose refrigeration pattern, press “wind speed increasing button” to choose the highest wind speed, press “set increasing button” to choose the lowest temperature.

②. Weak refrigeration operation

When it is slightly hot, especially the period of time after turning on air conditioner, the indoor temperature is suitable or even a little cool, you should choose this operation. That is: choose refrigeration pattern, press “wind speed decreasing button” to choose the lowest wind speed, press “set decreasing button” to choose the highest temperature.

③. Strong heating operation

When it is very cold, especially the period of time after just turning on the heater, it is cold inside the vehicle or sometimes there is frost, snow which needs removing, you should choose this operation. That is: choose heating pattern, press “wind speed increasing button” to choose the highest wind speed, press “set increasing button” to choose the highest temperature.

④. Weak heating operation

When it is slightly cold, especially the period of time after turning on the heater, the indoor temperature is suitable or slightly warm, you should choose this operation. That is: choose heating pattern, press “wind speed decreasing button” to choose the lowest wind speed, press “set decreasing button” to choose moderately low temperature.

⑤. Dehumidification and defrosting operation

When it is damp (including the indoor vapor and sweat made by human) and indoor temperature is higher than outdoor (including using heater), except the discomfort of dampness to human, a layer of frost will form on the inner side of the glass which will affect the view. Now you should choose this operation.

There are two ways of this operation:

a. When it is moderate or slightly hot, choose “weak refrigeration operation” (see ② for details)

b. When it is slightly cold, choose defrost pattern ( appear on the screen). At defrosting pattern, the refrigeration amount is set by the program, it can not be adjusted and there’s no display; the heating amount can be adjusted by operator according to requirements of the indoor temperature.

Other instructions

①. Machine set up: As long as you change the system operation pattern, the system will close the extrinsic cycle air door automatically (enter internal circulation pattern). If operator has to use the extrinsic cycle after changing the operation pattern or just start up, press  .

②. The machine will automatically remember any patterns (expect circulation wind pattern) or the change of set (including automatically remember the condition before shut down when turning off the machine), when you use this pattern again, the machine will return to the last condition (including automatically return to the condition before last shut down after start). It’s very convenient for the users, e.g when start the machine in the afternoon, it will automatically return to the using condition of the shut down in the morning.

Matters need attention

(1) For the air-conditioner cabinet with dust screen, the dust screen must be monthly cleaned, or it will be jammed by the dust, so the air in the cab cannot swimmingly flow through the heat exchanger and the air-condition effect will be worse.

(2) Under special conditions, (e.g damp or not too hot environment, dust screen jam, circulating port jam by foreign materials), using strong refrigeration for a long time, you will feel the wind is becoming smaller or even no wind, this is the representation of air conditioner vaporization and frosting. The frost on the vaporizer surface blocks the passage of air flow which makes refrigeration worse. But this is not malfunction, now you should stop refrigeration for a moment, remove the blocking materials, choose big wind and restart refrigeration after several minutes then it will become normal. After it’s normal, do not choose small wind and strong refrigeration at the same time, e.g you can choose medium refrigeration and weak refrigeration

(3) Please close the hot water valve before using the refrigeration system in summer or the aeration system in spring or autumn. In winter, please open the hot water valve before using the heating system.

(4) When using heating system in winter, use it after the water temperature of engine increases.

(5) For the radiator interlinks to the water tank of the engine, so, once it leaks, the water tank will lack water and the engine will overheat. In winter, protecting the radiator from being frozen crack is as important as the water tank. To prevent the cooling fluid from freezing and causing the radiator or the water tank cracks, please use the prescribed cooling fluid by the main engine plant. You’d better effuse the cooling fluid if the engine stops for a long time in winter, or it will freeze.

(6) The refrigerant will frostbite your skin and eyes especially. Furthermore, it will release poisonous light and gas when meets the naked flame. So, any time before the refrigeration system is disassembled, the refrigerant must be reclaimed or released at first, in order to avoid it sprays over skin or into eyes. During disassembling, please ensure no open flame aside.

(7) Please run the refrigeration system for 5 to 10 minutes every half a month if it is not be used over a long period of time.

(8) Items for regular check

No.	Items to check	Detail to check	Frequency	
			monthly	seasonally
1	all the fasteners	loose and drop or not	√	
2	belt	tautness and abrasion	√	
3	pipelines	gall or break	√	
4	joints	gall or leak		√
5	condenser	jammed by dust or not	√	
6	cluster	wear out, burn or not		√
7	Electromagnetic clutch (compressor)	skid or not	√	
8	compressor	anomalous sound		√
9	quantity of refrigerant	bubble in the fluid-inspection lens	√	
10	dust screen	dirty or jammed	√	

Note:

(1) As figure 3.10.5 (left) shows, when check the tautness of the belt, press it by force in 15N. The sinkage between 5mm to 7mm (4~5mm) is appropriate.

(2) As figure 3.10.5(right) shows, when check the quantity of the refrigerant, please judge it according to the bubble in the fluid-inspection lens.

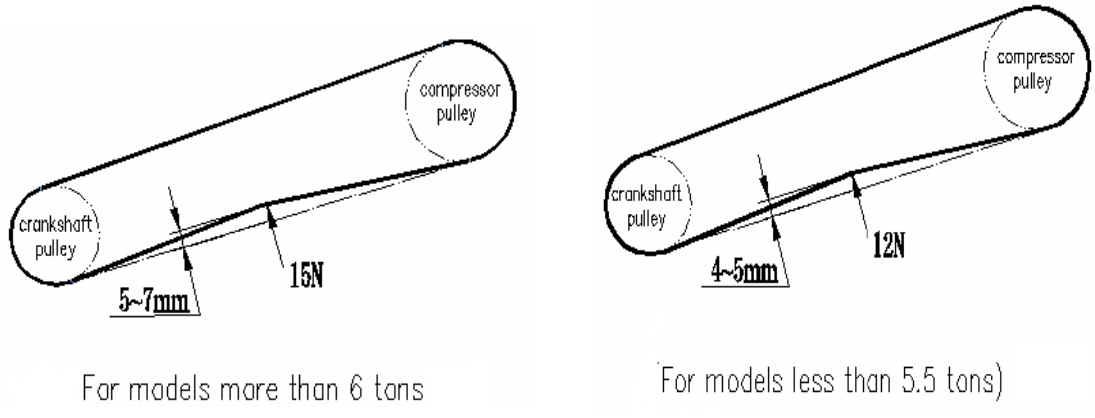
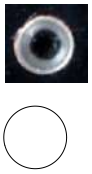
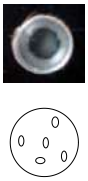
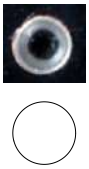
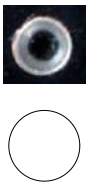
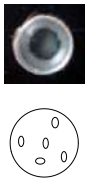
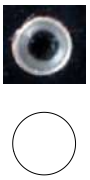


Figure 3.10.5

Refrigerant	Fluid inspection lens	Other conditions	note

filling amount	photos/figures			Condition description		
	The moment of start	working	After shut down			
Too much				Fluid inspection lens is clear with no bubble at the moment of start, working or after shut down.	Air outlet is not cold enough, condenser inlet is very hot and the condenser outlet is like the environment temperature, the pressure at both sides is high (especially the high pressure side)	Check and release the excessive refrigerant
Slightly much				Fluid inspection lens is clear with no bubble, bubble appears at start and 10 minutes after shut down.		no need to check and repair
Proper amount				Fluid inspection lens is clear with no bubble when working, a few bubbles appear at start and in 10 seconds after shut down.	Air outlet is cold, condenser inlet is very hot, condenser outlet is hot or warm, air intake duct is cold with normal pressure at both sides.	
Slightly insufficient				A few bubbles appear during work		
Extremely insufficient				Too many bubbles appear during work	Air outlet is not cold enough, condenser inlet is not hot enough, condenser outlet is like the environment temperature, air intake duct is warm and the pressure of high pressure side is very low.	Check, repair and fill refrigerant

<table>
<tr><td rowspan="2">Almost no</td><td>  </td><td>  </td><td>  </td><td>Fluid inspection lens is clear with no bubble at start, when working or shut down.</td><td rowspan="2">Air outlet is not cold, condenser inlet is not hot, condenser outlet is like environment temperature, air intake duct is warm and the side pressure is low.</td><td rowspan="2"></td></tr>
<tr><td>  </td><td>  </td><td>  </td><td>No bubble at start and after shut down, a few bubbles appear when working with long strings of oil dripping and oil stain sometimes.</td></tr>
<tr><td colspan="7">Note： The above mentioned outcomes all happen on hot days. Owing to the external conditions, etc, sometimes it’s hard to judge the condition of fluid inspection lens, so pay attention to the high and side pressure and fluid inspection lens at the same time when filling refrigerant.</td></tr>
</table>

(9) Cautions while disassembling the pipeline system

①. The joints disassembled from the pipelines must be sealed in time to make the inner system exposed to air for a short time as possible, avoiding the wet air from entering the system.

②. Please dip some drops of refrigerant oil onto the O-type gasket before assembling the pipelines.

③. While assembling or disassembling the pipe joint, two spanners must be strong in an opposite direction to avoid distorting the pipe.

④. The following is the reference torques for screwing down the pipeline joint:

Joint Type	Torque (N m)
Nut (HEX 19mm)	12-15
Nut (HEX 22-24mm)	20-25
Nut (HEX 27mm)	30-35
Bolt with flange (M6)	4-7
Bolt with flange (M8)	13-19

(10) If you find the electromagnetic clutch of the compressor attracts and disengages frequently, that is because the condenser is too dirty, there is some air in the system or the refrigerant is overfull to make too high pressure, the air-conditioner must be shut down at once and be repaired by professional maintenance people.

3.11 ACCUMULATOR

Warning：

The accumulator is charged with high-pressure nitrogen gas. Improperoperation may lead to explosion and result in serious injury or damage.

When handling accumulator, always follow the steps below.

- The pressure in control piping could not be completely released. When disassembling hydraulic devices, do not stand in the oil ejecting direction. Loosen the bolts gradually.
- Do not disassemble accumulator.
- Do not place the accumulator close to naked flame or get it exposed in fire.
- Do not drill holes or weld on accumulator.
- Do not get accumulator hit, rolled or shocked.
- When handling accumulator, it's necessary to bleed the air. Please contact distributor.

  The accumulator is fixed in control piping. The accumulator is a device being used to store pressure. With this accumulator equipped, you are allowed to operate controlling piping in a short time, even if engine stops. Therefore, work equipments could be lowered under their own weight by means of control lever.

Releasing pressure on a machine equipped with accumulator.

- Lower the work equipment on the ground, turn off its breaker or other accessories.
- Stop the engine.
- Shift starting switch to ON position to flow the circuit current.
- Set safety lock lever to free position. Operate work equipment lever and accessory controlpedal forward, backward, leftward and rightward alternately to release pressure in piping.

Set safety control lever to LOCK position to lock up control lever and accessory pedals.

Power Main Switch

Note

- **Before starting machine, open power main switch.**
- **After flameout engine,take out key and turn off power main switch.**

4.TRANSPORTATION AND STORAGE

4.1 GENERAL TRANSPORTATION RULES

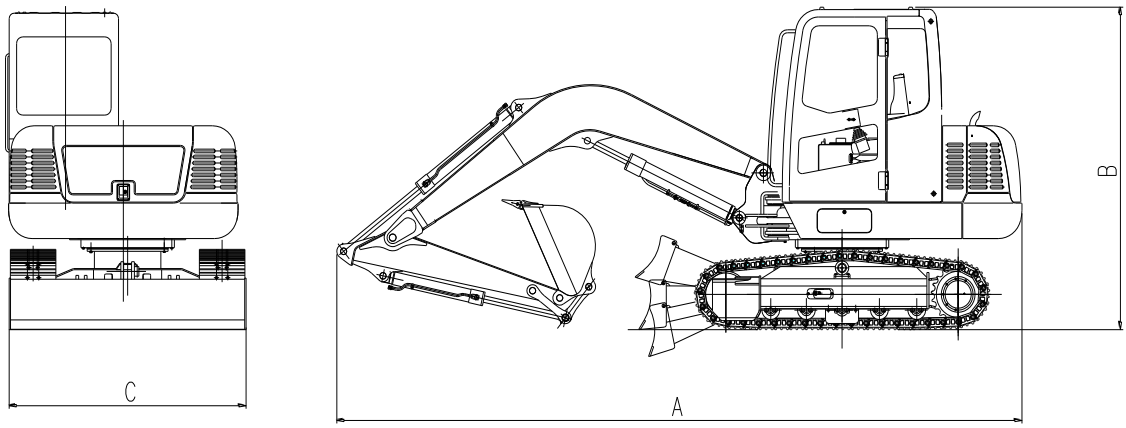
- Before using trailer to transport machine, contact local traffic department to confirm relevant regulations, make sure that machine's overall length, width, height and weight are within allowed spec.
- If there are any dimensions out of spec, obtain special permission from relevant government agencies or dismantle the machine into smaller unit to transport.
- Select proper transportation tools according to machine's weight, length, width and height.
- Survey the traffic condition for transportation in advance, e.g. road condition and width, height of bridges and tunnels as well as the limits of weight and traffic regulation etc.

Note

- Transportation weight and dimension of the machine may change with different configuration of the front device and accessories.

- Please choose the appropriate trailer. Consult with your authorized dealer about the using of those trailer
- Loading and unloading the machine only on firm and level ground.

4.2 TRANSPORT DIMENSION



Transportation dimension please check chapter 5 "Technical Specification of Machine"

4.3 TRANSPORT ON HIGHWAY

Before transportation on highway (As figure 4.1.2), you should know and follow all the related regulations.

Figure 4.1.2

A. Check the length, width, height, and weight of the trailer that loads excavator.

B. Check transportation route conditions, such as dimension and weight limitations and traffic rules.

C. Sometimes, it is necessary to separate excavator to smaller parts to satisfy the limitations of dimension or weight.

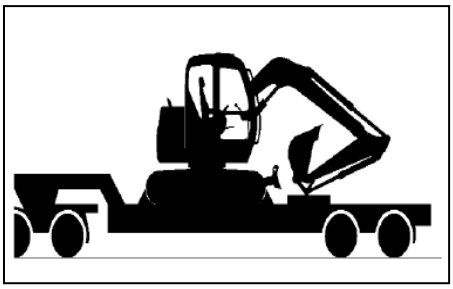


Figure 4.1.3

Transport excavator with trailer

Please choose proper trailer to transport the whole excavator (As figure 4.1.3).

Please consult with your dealer for the trailer choice.

The trailer should be placed on hard horizontal ground to load and unload excavator.

WARNING

Make sure using slope or loading platform to load or unload.

Slope or loading platform

(1) Before loading or unloading, clean the slope or loading platform and the carriage bed. The slope, loading platform, and carriage bed with smear, earth, or ice have the danger of slippage.

(2) Place chocks under the trailer head or wheels when use slope or loading platform to load or unload.

(3) The slope should have enough width, length, and intensity. The obliquity of slope should be less than 15° without fail.

(4) Loading platform must have plenty of width and intensity to support excavator, and the gradient must be less than 15°.

4.4 LOAD AND UNLOAD

WARNING

1. **The machine should travel at lowest speed on slope.**
2. **To avoid turning when move on slope, if need turning, the machine should return to the ground or trailer bed, modify the travel direction, then pass the slope.**
3. **The intersection of slope top and trailer bed is protuberant, pass it carefully.**
4. **Prevent the possible upset and injury when the superstructure of excavator swings. Retract, lower arm and swing superstructure slowly to achieve best stability.**

Loading

(1)The direction of excavator is as follows:

- With foreside attachment: the machine moves forward with the working device ahead. (As figure 4.1.4)
- Without foreside attachment: move backward as figure shows.

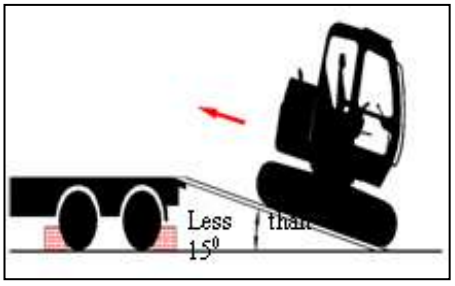


Figure 4.1.4

(2) The midline of excavator should be at the trailer's midline.

(3) Advance the excavator to the top of slope slowly with 90^0~110^0 foreside attachment:

- Lift dozer blade to highest position, support the machine on trailer with bucket, the angle between arm and boom should be 90°--110°
- When the excavator begins leaning to the trailer bed, place bucket on the trailer, travel forward slowly, until the crawler reach trailer entirely and be fixed on trailer bed (As figure 4.1.5).

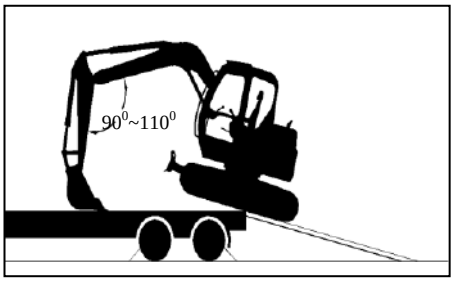


Figure 4.1.5

- Lift bucket slightly, retract arm and keep it at the underside. Slew superstructure slowly to 180° (As figure 4.1.6).
- Lower bucket to stow-wood.

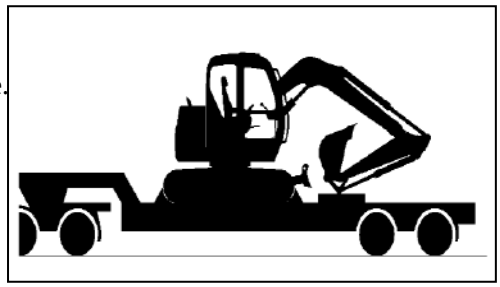


Figure 4.1.6.

(4) Stop engine and take out the key.

(5) Move control lever for a few times to release the pressure of hydraulic cylinder.

(6) Pull the pilot shutting off lever to locked position.

(7) Close the window, ventilation top window, and door, cover the exhaust outlet to prevent rain entering into.

CAUTION

In cold weather, you should warm up the machine before loading or unloading.

WARNING

Tie the chain or thick rope on the chassis frame, don't traverse or press the chain or thick rope on the hydraulic pipe or hose.

Transportation

- Place chocks at the front and rear of crawler to fasten machine.
- Fasten the 4 corners and foreside attachment of machine on the trailer with chain or thick rope (As figure 4.1.7).

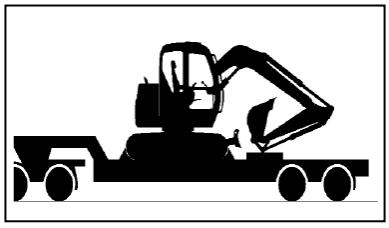


Figure 4.1.7

Unloading

WARNING

- **The machine should travel at lowest speed on slope.**
- **To avoid turning when move on slope, if need turning, the machine should return to the ground or trailer bed, modify the travel direction, then pass the slope.**
- **The intersection of slope top and trailer bed is protuberant, pass it carefully.**

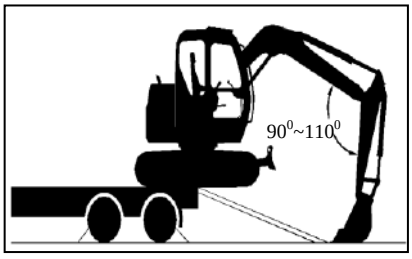


Figure 4.1.8

【**Important**】Prevent the possible damage to working device. During unloading, keep the angle between arm and boom as 90 °, unloading with arm retracted may cause the machine damaged.

A. When the machine travel from trailer bed to slope as illustrated, place the bucket to the ground as figure, the angle between arm and boom should be 90°--110° (As figure 4.1.8).

【**Important**】Prevent the possible damage to the hydraulic cylinder. Don't allow the bucket to collide with the ground.

B. You must place the bucket to ground before the machine heel over (As figure 4.1.9).

C. During the excavator moving forward, lift boom and extend arm, until the excavator leave the slope.

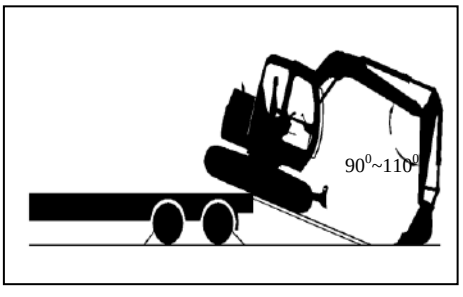


Figure 4.1.9

4.5 STORAGE

Long-term storage of machine

While storing the machine, retract the cylinder piston rod to the inside of cylinder as much as possible to avoid piston rod corrosion caused by rain and wind, clean machine surface and all the exposed parts.

Machine handling before storage

(1) Grease the parts that need lubrication until fresh grease runs out.

(2) Change engine oil.

(3) Grease the exposed surface of piston rod.

(4) Fill in diesel oil to the fuel oil tank to the full.

(5) Choose a proper storage place：It's best to store the machine in a room, if it can only be stored outdoors, you should choose a flat ground and cover the machine with cloth.

Machine storage period

(1) Run the machine once a month during storage period.

(2) Run the air-conditioner system once a month.

Machine handling after storage

(1) Wipe the grease off on piston rod surface.

(2) Grease all the places that need lubrication.

(3) Check engine oil level to make sure it is in a stipulated position, otherwise you should fill oil. If there is any water in oil, change oil

(4) Turn the key to "ON" position, switch accelerograph button from low to high speed and last for 3 seconds, then switch to low speed and start engine.

5. MAINTENANCE

Fuel and lubrication chart (As figure 5.1.1)

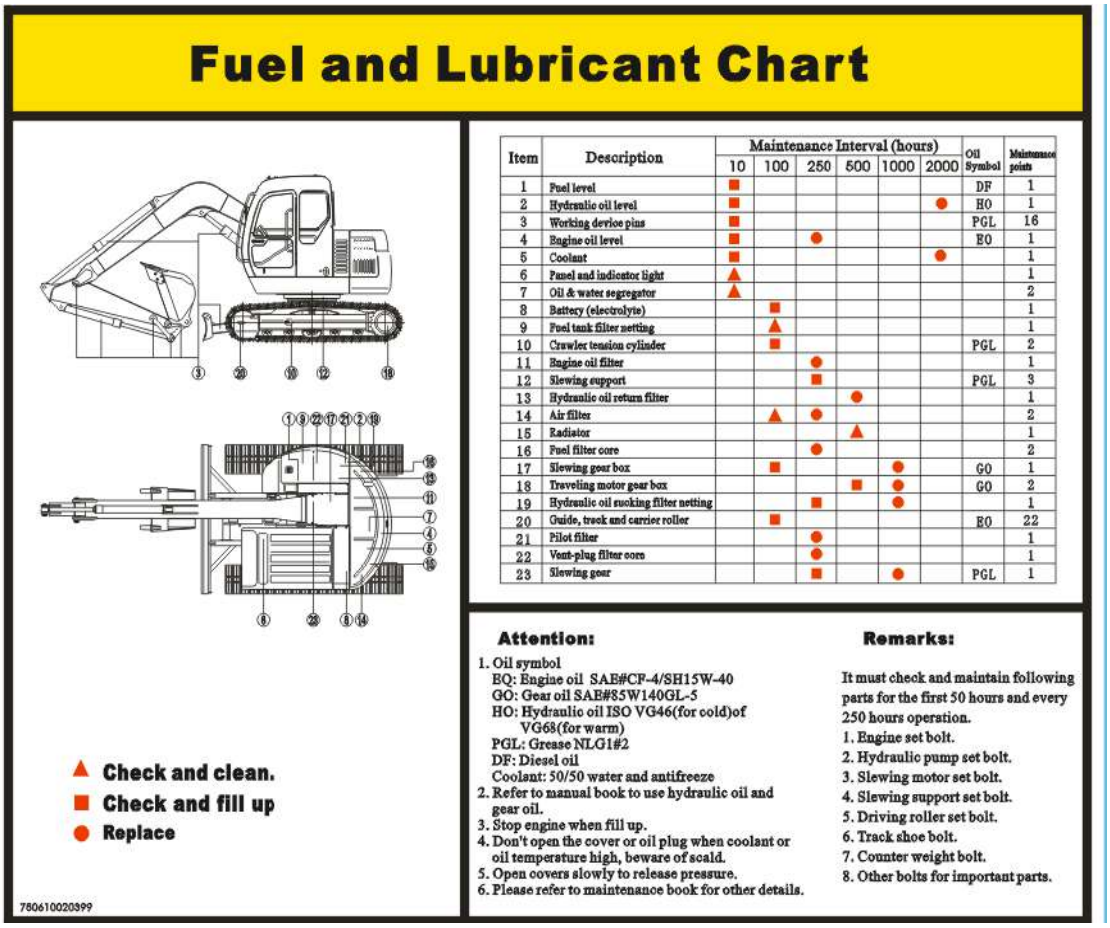


Figure 5.1.1

5.1 MAINTENANCE RULES

Study how to correct maintenance excavator, please abide by the correct maintenance and inspection procedures of this manual.

5.1.1 Correct Maintenance and Inspection Procedure

【Important】

- Use recommended fuel, hydraulic oil, and lubricant.
- Only use original SUNWARD parts.
- If user doesn't use recommended fuel, hydraulic oil, lubricant, and original SUNWARD parts, the warranty is automatically invalid.

- Never adjust engine rev limiter or hydraulic system safety valve.
- Avoid electric parts touching with water and vapour.
- Never disassemble engine pump controller, sensor, etc.

5.1.2 Checking Excavator Before Daily Starting

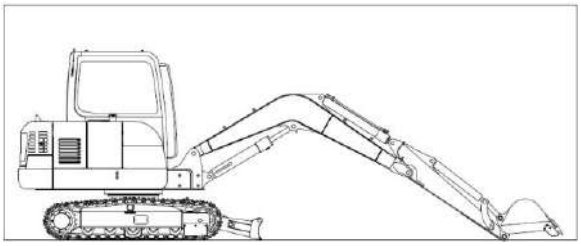
Check excavator before daily operation.

- Check monitor.
- Check all liquids level.
- Check the leakage, distortion, abrasion, and damage of hoses and pipes.
- Check the noise, temperature around excavator.
- Check the slack or loss of parts.
- Repair the excavator before operation if the machine has problems, or consult your dealer.

5.1.3 Periodic Maintenance

- Check the work meter daily and whether it's time to do the maintenance.
- The intervals in the periodic maintenance list are based on the normal condition. If operate excavator in malcondition, the intervals should be shorten.

5.1.4 Preparation for Maintenance

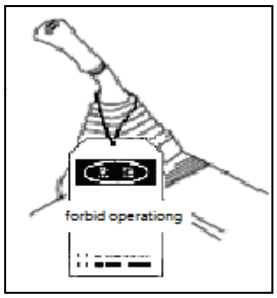


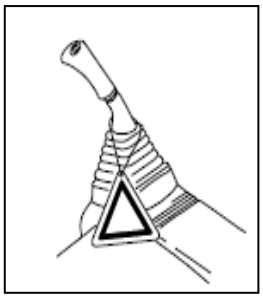
- Place the machine on a hard horizontal ground.
- Lower the bucket to the ground.
- Operate engine at low rev for 5 minutes.
- Stop engine, and take out the key from switch. (If it is necessary to maintain the machine as the engine runs, operator can't leave cabin)
- Pull the pilot control lever to "LOCK" position.
- Before maintenance, please hang the label "DO NOT OPERATE" tag on left joystick.

5.1.5 Using Fuel and Lubricant Correctly

【Important】

Always use recommended fuel and lubricant, otherwise it damage the machine and lose the warranty of Sunward.





5.1.6 Checking Discharged Grease And Used Filter Core

- With oil or filter core replaced, check used oil and filter core for any metal chips and debris. If a large amount of metal chips or debris are found, report to the owner of the machine or your superior, and take proper measures.

5.1.7 Inspection After Maintenance

Accidents may occur and cause serious injury or damage, if failed to check after inspection and maintenance. Follow the steps below to carry out inspection.

- **Check after inspection and maintenance(with engine stopped)**
  - Have any inspection and maintenance points been forgotten?
  - Have all inspection and maintenance items been carried out? Check one by one. .
  - Have any tools or parts been dropped inside the machine? It's particularly dangerous if parts are dropped inside the machine and get caught in the link mechanism.
  - Check for any water and oil leakage. Be sure all bolts have been tightened at specified torque.
- **Inspection when operating engine**
  - For any detail information about the checks when operating engine. Please refer to section 1.4.3
  - Are the inspection and maintenance items working properly?
  - Is there any leakage of fuel or oil when engine speed is raised and applying loads to hydraulic system?

5.1.8 Electrical System Maintenance

- It is extremely dangerous if the electrical equipment becomes wet or the covering of the wiring is

damaged. This will cause an electrical short circuit and may lead to malfunction of the machine.

- Do not use water to flush the inside of the operator's cab.
- Do not allow water to get into the electrical components.
- Service relating to the electric system is checking fan belt tension, checking damage or wear to the fan belt and checking battery fluid level.
- Never install any electric elements other than those specified by SUNWARD.
- When working at seashore, carefully clean the electric system to prevent corrosion.

5.1.9 Hydraulic System Maintenance

Hydraulic equipment is at a high temperature during operations and immediately after operations. During operation, it's also under high pressure, so be careful of the following points when carrying out inspection and maintenance of hydraulic related equipment.

- Stop the machine on level ground, lower the bucket completely to the ground.
- Always stop the engine and release pressure in hydraulic piping.
- Immediately after the engine is stopped, the hydraulic oil and lubricants are at a high temperature and high pressure. Wait for the temperature to go down before starting the maintenance operation.
- Even when the temperature goes down, the circuits may be under internal pressure, so when loosening plugs, screws, or hose connections, do not stand directly in front. Loosen gradually to release the internal pressure before removing.
- Always release the air in the hydraulic tank to remove the internal pressure before carrying out inspection and maintenance of the hydraulic circuit.
- Inspection and maintenance works include checking the hydraulic system for oil level, replacement of filter elements and replacement of hydraulic oil.
- If high pressure hoses have to be removed, check that there is no damage to the O-rings. If any damage is found, replace the O-ring.

5.2 OIL, COOLANT AND FILTER

5.2.1 Lubricant and Hydraulic Oil

- Oil is used in the engine and hydraulic equipment under extremely severe conditions (high temperature, high pressure), and deteriorates with the use.
- Always use oil that matches the grade and maximum ambient temperatures recommended in the operation and maintenance manual.
- Even if the oil is not dirt, always change the oil at specified interval.
- Always be careful when handling it to prevent any impurities (water, metal particles, dirt, etc.) from getting in. the majority of problems with machines are caused by the entry of such impurities.
- Never mix oils of different grades or brands.
- Always add specified amount of oil.
- If the oil in the work equipments is not clear, there is probably water or air getting into the circuit. In such cases, please contact your SUNWARD distributor.
- When changing the oil, always replace the related filters at the same time. Especially when changing engine oil filter before installation, add specified fresh and clean oil to new filter.
- We recommend you have an analysis made of the oil periodically to check the condition of the machine. Foe those who wish to use this service, please contact your SUNWARD distributor.
- The hydraulic system has been filled with SAE 10W CD oil, when the machine is shipped from factory
- Do not use any hydraulic oil other than those recommended by SUNWARD. Failure to do so may cause filter clogging.
- When changing hydraulic oil, clean up thoroughly the residual oil in piping and cylinder.

5.2.2 Fuel

- The fuel pump is a precision instrument. If fuel containing water or dirt is used, it can not work properly.
- Be careful not to let impurities get in when storing or adding fuel.
- Always use the fuel specified in the Operation and Maintenance Manual.
- Fuel may congeal depending on the temperature when it is used (particularly in low temperature below

-15℃（5℉）. it's necessary to use the fuel that is suitable from the temperature.

- To prevent humidity in air to condense in fuel tank to form water, top up oil tank after the work is finished everyday.
- Before starting the engine, or when 10 minutes have passed after adding fuel, drain the sediment and water from the fuel tank.
- If there runs out of fuel, or if the filters have been replaced, it is necessary to bleed the air from the circuit.

5.2.3 Coolant in Cooling System

- River water contains large amount of calcium and other impurities, so if it is used, scale will stick to the engine and radiator, and this will cause defective heat exchange and overheating.
- When using antifreeze, always observe the precautions given in the Operation and Maintenance Manual.
- Antifreeze is flammable, so be extremely careful not to expose it to flame or fire.
- The proportion of anti-freeze to water differs according to the ambient temperature.
  For details of the mixing proportions.
- If engine is overheating, before adding coolant, wait for the engine to cool down.
- If the coolant level is low, it will cause overheating and will also cause problems with corrosion from the air in the coolant.

5.2.4 Grease

- Grease is used to prevent twisting and noise at the joints.
- If any part becomes stiff after being used for long time, add grease.
- Always wipe off all of the old grease that is pushed out when greasing. Be particularly careful to wipe off the old grease in places where sand or dirt sticking in the grease would cause wear of the rotating parts.

5.2.5 Oil and Fuel Storage

- Keep indoors preventing any water, dirt, or other impurities from getting in. if drums have to be stored outside, cover them with a waterproof sheet or take other measures to protect them.
- When keeping drum cans for a long period, put the drum on its side so that the filler port of the drums is

at the side to prevent moisture from being sucked in.

- To prevent any change in quality during long-term storage. Be sure to use in the order of first in- first out (use the oldest oil or fuel first).

5.2.6 Filter

- Filters are extremely important safety parts. They prevent impurities in the fuel and air circuits from entering important equipment and causing problems.
- Replace all filters periodically.
- Do not clean the filters (cartridge type) and use again.
- When replacing filters, check if any metal particles are affixed to the old filter. If any metal particles are found, contact your SUNWARD distributor.

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

5.2.7 Fuel and Coolant Specification

		Ambient temperature	Specified capacity	Refill capacity
		-22 -4 14 32 50 68 86 104 122^0F -30 -20 -10 0 10 20 30 40 50^0C		
Engine oil pan	Engine oil	SAE 30 SAE 10W SAE 10W-30 SAE 15W-40 SAE 5W-30		
Swing reductor		SAE 30		
Travel reductor				
Hydraulic system	Hydraulic oil	SAE 10W SAE 10W-30 SAE 15W-40		
Fuel tank	Diesel	ASTM D975 No.2 ★ GB252 premium-20# light diesel GB252 premium -35# light diesel		
Rotation mechinsm	Grease	NLGI No.2		
Oil cup				
Cooling system	Coolant	Adding coolant		

5.3 TIGHTENING TORQUE SPECIFICATION

Note

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

5.3.1 Tightening Torque Table for Bolts and Nuts

Thread diameter (mm)	Across flats (mm)	Tightening torque					
		Target value			Service limit		
		N• m	kgf• m	lbft	N• m	kgf• m	lbft
6	10	13.2	1.35	9.8	11.8 - 14.7	1.2 - 1.5	8.7 - 10.8
8	13	31	3.2	23.1	27 - 34	2.8 - 3.5	20.3 - 25.3
10	17	66	6.7	48.5	59 - 74	6.0 - 7.5	43.4 - 54.2
12	19	11	11.5	83.2	98 - 123	10.0 - 12.5	72.3 - 90.4
14	22	177	18	130.2	157 - 196	16.0 - 20.0	115.7 - 144.7
16	24	279	28.5	206.1	245 - 309	25.0 - 31.5	180.8 - 227.8
18	27	382	39	282.1	343 - 425	35.0 - 43.5	253.2 - 314.6
20	30	549	56	405.0	490 - 608	50.0 - 62.0	361.7 - 448.4
22	32	745	76	549.7	662 - 829	67.5 - 84.5	488.2 - 611.2
24	36	927	94.5	683.5	824 - 1030	84.0 - 105.0	607.6 - 759.5
27	41	1320	135.0	976.5	1180 - 1470	120.0 - 150.0	868.0 - 1085.0
30	46	1720	175.0	1265.8	1520 - 1910	155.0 - 195.0	1121.1 - 1410.4
33	50	2210	225.0	1627.4	1960 - 2450	200.0 - 250.0	1446.6 - 1808.3
36	55	2750	280.0	2025.2	2450 - 3040	250.0 - 310.0	1808.3 - 2242.2
39	60	3280	335.0	2423.1	2890 - 3630	295.0 - 370.0	2133.7 - 2676.2

5.3.2 Tightening Torque Table for Hoses

Normal No. of threads	Across flats (mm)	Tightening torque					
		Target value			Permissible range		
		N•m	kgf•m	lbft	N•m	kgf•m	lbft
9/16-18UNF	19	44	4.5	32.5	35 - 63	3.5 - 6.5	25.3 - 47.0
11/16-16UN	22	74	7.5	54.2	54 - 93	5.5 - 9.5	39.8 - 68.7
13/16-16UN	27	103	10.5	75.9	84 - 132	8.5 - 13.5	61.5 - 97.6
1-14UNS	32	157	16.0	115.7	128 - 186	13.0 - 19.0	94.0 - 137.4
13/16-12UN	36	216	22.0	159.1	177 - 245	18.0 - 25.0	130.2 - 180.8
1-7/16-12UN-2B	41	215	22.0	159.1	176 - 234	18.0 - 24.0	130.2 - 180.8

★**Note:** the ★ marked torques represent tightening torque for hoses above swing joint.

5.4 ENGINE MAINTENANCE GUIDE

5.4.1 Adding Lubrication Grease

Parts name		Qty	Interval (hours)						
			8	50	100	250	500	1000	2000
Connection pins of working device	Connection pins for boom and platform	1/2	★△	▵					
	Connection pins for boom cylinder ends	2	★△	▵					
	Pins for bucket and arm	6/8	★△ ★★	▵					
	Pins for dozer blade cylinder ends	2			▵				
	Connection pins for dozer blade and platform	2			▵				
Slewing support bearing		2		▵					
Slewing inner gear ring		1					▵		

★★ means that these parts need maintaining when working in water or mud.

Recommended Lubrication Grease

	Bucket, bucket arm and boom, rotary gear, swing bearing etc.
	—20 to 40°C（—4 to 104F）
BP	BP Energrease Ls—EP2
Caltex	Multifax EP2
Esso	Beacon EP2
IDEMTSU KOSAN	Daphne Coronex Grease EP2
Mobilux	Mobilux EP2
FUCHS	2# extreme pressure lithium grease
Shell	Shell Alvania EP Grease 2
remark	Lithium grease with extreme high load capacity

5.4.2 Engine Oil

Parts name		Qty	Interval (hrs)							Remark
			8	50	100	250	500	1000	2000	
1.Engine oil	Check oil level	1	△							
2.Engine oil	Replace	5L /8L		△ ★		△				
3.Engine oil filter	Replace	1				△				

Note：★ mean that it must replace oil in the first 50 hours operation of machine,then replace oil every 500 hours.

Please maintain as the requirement in diesel engine manual book.

- **The performance of engine oil is different, commonly the engine oil adopts API or CCMC standard.**

  Recommended engine oil grade and brand are listed in the following table：

Engine oil / supplier	-20℃ to 0℃	-10℃ to 35℃	25℃ to 40℃
Esso	Essolube D-3		
	10W	30	40

Esso	Essolube D-3		
	10W	30	40
apollo	Apollo oil Super Wide 15W-40		
Mobil	Mobil Delvac		
	1310	1330	1340 ※
Fuchs	15W-40		
Fina	CF15W-40		

Note : The machines are shipped from factory with ※ marked engine oil.

5.4.3 Gear Oil

Parts name		Qty	Interval (hours)						
			8	50	100	250	500	1000	2000
Traveling reducer	Check oil level	—				△			
	Replace	2x2 L						△	

※ Check oil level every 250 hours, refill if necessary.

Note: The specific filling quantity of gear oil must be comfirmed by height of oil level.

Recommended gear oil name

Gear oil / supplier	Gear oil -20℃ to 40℃
Esso	Esso Gear Oil GP80-90,GP85W-90
ENEOS	Gear Lube Sp90
Mobil	Mobilube Gx90 ※
Fina	GL-580W-90
Great wall(Sinopec)	85W/90
Shanghai oil	API-GL-4 85W/90

Note: the machines are delivered from factory with ※ marked gear oil.

5.4.4 Hydraulic System

Parts name		Qty	Interval (hrs)							
			8	50	100	250	500	1000	1500	2000
1. Check hydraulic oil lever		——	△							
2.Discharge sundries of hydraulic oil tank		——				△				
3. Replace hydraulic oil		105L							△	
4. Clean oil inhaling filter		——				△				
4. Replace oil inhaling filter		——						△		
5. Clean oil returning filter		——			△					
5. Replace oil returning filter core.		——					△			
6. Replace pilot oil filter		——				△	△			
7. Replace hydraulic oil tank inspirator		——					△			
8. Check hose and pipeline	Leakage	——	△				△			
	Crack and distortion	——				△				

Note: ※-The replacement interval will be different with various kinds of hydraulic oil.

Recommended hydraulic oil name

Oil type	Hydraulic oil			
Service point	Hydraulic system			
Replace interval	2000 hour		1500 hour	
Ambient temperature / brand / supplier	-20℃ to 40℃	-10℃ to 40℃	-20℃ to 40℃	-10℃ to 40℃
Fina	HM46			
Esso Standard	Essolube D-3 10W 30			40
Mobil	AW46			
Shell	1310			

Fuchs	LC46			
Caltex	HD46			
Remark	Abrasive-resistance hydraulic oil			

5.4.5 Fuel System

Parts name		Qty	Interval (hours)						
			8	50	100	250	500	1000	2000
1. Vent fuel tank sediment		1	△						
2. Check and vent sundries in precipitator		1		△ ※1				△	
3. Vent water and sediment in water segregator		1	△						
4. Replace fuel filter		1					△		
5. Check fuel hose	Leakage, crack, etc	—	△						
	Crack, bend, etc	—				△			

Note: ※Check and vent precipitator every 50 hours, replace every 1000 hours.

Recommended fuel:

Only use high quality diesel oil, don't use kerosene.

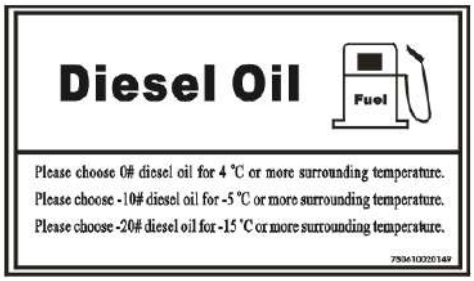


Figure 5.5.1

Fill oil (As figure 5.5.1)

WARNING

Dispose fuel carefully, you must stop engine before filling fuel. Never smoking when you fill fuel into tank or fuel system works.

A. Refer to "stop engine" chapter, park excavator and stop engine correctly.

B. Check fuel display, and fill fuel if necessary.

C. Prevent dirt, dust, water, and other sundries entering into fuel tank and fuel system.

D. To prevent clogging, fill fuel after daily work, and not to splash fuel on excavator or ground.

E. Fit on the cover after fill fuel.

5.4.6 Air Filter

Parts name		Qty	Interval (hrs)						
			8	50	100	250	500	1000	2000
1. Outer filter core	Clean	1	Or indicator light lights on			Δ			
	Replace	1	5 times clean or 1 year						
2. Inner filter core	Replace	1	When outer parts replaced						
3. Connection pipeline between air filter and engine	Check Sealing		Δ						
	Replace		When pipeline has crack and air leakage, replace it in time.						

5.4.7 Cooling System

Parts name		Qty	Interval (hrs)						
			8	50	100	250	500	1000	2000
1. Check level of cooling water		1	Δ						
2. Check and adjust fan belt tension		1		※1	Δ				
3. Replace cooling water		21.7L	Twice a year ※2						
4. Clean radiator and hydraulic oil cooler core	Outer	1				Δ ※3			
	Inner	1	When replace cooling water						
5. Clean condenser of air- condition (optional)		1				Δ ※3			

CAUTION

- **Only maintain in the first inspection.**
- **When the machine is delivered, water and long lifetime cooling fluid have been filled in the cooling system. You can replace the cooling water after a years or 2000 hours operation if you always use manufacturer's original long lifetime time cooling fluid.**
- **Operate the machine at dust area, shorten maintenance interval.**

5.4.8 Air Conditioner Maintenance

Item		Method	Interval (hours)				
			8	50	250	1000	2000
Cooling system	Refrigerant	Watch liquid flowing condition through liquid gauge		Δ			
	Pipeline	Whether there is hose cracked or damaged or not				Δ	
		Whether there is leakage at every coupler or not				Δ	
		Whether fixing hoop slack or damaged or not			Δ		
Compressor	Coolant	Replace SP—20 coolant					Δ
	Belt	Belt tension and abrasion			Δ		
	Compressor bracket	Whether intact and well fixed or not			Δ		
Condenser	Condenser core	Whether it is clean or damaged or not		Δ			
	Foreside condenser	Whether there is sundries				Δ	
	Condenser bracket	Whether loosened, damaged or not		Δ			
Evaporator	Evaporator bracket	Whether damaged, well fixed or not			Δ		
	Cycling wind inlet	Whether well ventilated or not			Δ		
	Fan motor	Whether good touching, and motor in good condition or not.					Δ

5.4.9 DPF Regeneration

5.4.9.1 Stationary Regeneration Requst Light

1Hz: When Reset Regeneration is active, and the DPF Regeneration Disable Switch (REGMSW) is inhibited and engine warming is done.

ON: When standby of Stationary EM mode or Recovery Regeneration is active, and engine warming is done.

ON: When the standby of Stationary Allow mode is active, and interlock SW is permitted, and REGMSW is permitted and engine warming is done.

ON: When 50hr passed after Reset or Stationary or Recovery Regeneration, and the REGMSW is inhibited, and engine warming is done.

ON: When Regeneration is required.

5.4.9.2 Exhaust Temperature Warming Light

ON: When Reset or Recovery Regeneration is actived.

5.4.9.3 Regeneration Permitted Indicator Light

1Hz: When Reset Regeneration is active, and the DPF Regeneration Disable Switch (REGMSW) is inhibited and engine warming is done.

1Hz: When standby of Stationary EM mode or Recovery Regeneration is active, interlock is permitted and engine warming is done, engine rev is at low idle speed.(press regerneration switch to begin)

1Hz: When the standby of Stationary Allow mode and interlock switch is permitted, regeneration prohibit switch is permitted and engine warming is done, engine rev is at low idle speed.(press regerneration switch to begin).

1Hz: When 50hr passed after Reset or Stationary or Recovery Regeneration, and the REGMSW is inhibited, and interlock switch is permitted, engine warming is done.

ON: When stationary regeneration or recovery regeneration is active or press regeneration request switch.

5.4.9.4 Engine Fault Light

ON: When standby of Stationary EM mode is active or clear dust or engine is at standby mode.

ON: When there's other problems occur.

5.4.9.5 Regeneration Request Switch

Standby regeneration request switch is only used when standby regeneration request lamp is lighting(engine can not automatically regeneration).

5.4.9.6 Interlock Switch

When it is on the stationary regeneration, it must first to use regenerated interlock switch to lock hydraulic system when the engine can not be regenerated.

5.4.9.7 Stationary Regeneration Operation Processes

If DPF regeneration request indication lamp is lighting ,please do stationary regeneration as the following operation.

Warning：

If ignore regeneration request indicate lamp, go on to work ,too many PM will be accmulated and then cause fire.

When regeneration request indication lamp is lighting means engine must do manually stationary regeneration and do the followling operation:

1、Place the excavator to the safety and ventilated place.

2、Decreased accelerate to the lowest and operate it at the idle speed

3、Press “LOCK”, regenerated permit lamp begin to splink

4、Press DPF regenerate request switch begin to stationary regeneration

（1）When begin to do stationary regeneration ,after rev of engine recend to the high idle speed, reset rengeneration begins.

（2）When begins to do stationary generation, DPF regeneration request indication lamp flame out, regeneration permition indication lamp from splink to lighting, vent temperature warning lamp from flame out to be lighted

（3）Stationary regeneration must be continued 25 to 30 minutes.

（4）If you want to cut off regeneration ,please do the following operation:

① Pull regeneration inter-lock to "not regenerated".

② Pull DPF regeneration switch to “forbid regeneration”.

③ Increased accelerator.

④ Turn off key switch.

（5）After regeneration,engine rev decreased to low idle speed, regeneration permition lamp and vent temperature warning lamp flame out, stationary regeneration is finished.

Note：

◆ Do not operate in the closed place,or it will be poisoned by carbon monoxide

◆ Regeneration will make the temperature is rising up ,please make sure there is no inflammable things around vent-pipe to avoid fire.

◆ Forbid touching vent-pipe.the temperature of vent-pipe is high,forbid standing nearby it.

◆ Please check if the fuel quantity is enough before stationary regeneration, make sure the engine run 1 hour at least.

◆ Make sure except PM, there is no other faults.

5.4.10 Others

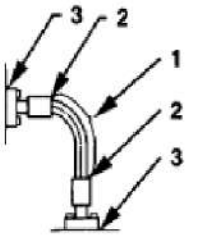
item	QTY	Interval (hour)						
		8	50	100	250	500	1000	2000
Check bucket teeth for fray and looseness	——	△						
Replace bucket	1	Interval						
Adjust bucket connection clearance	1	Interval						
Check and replace seat belt	1	△	Every 3 years（replace）					
Add wind shield detergent	——	Interval						
Check track sag	2		△					
Adjust track sag	2	Interval						
Check air conditioning system	1	△						
Clean cab floor cushion	1	Interval						
Check tightening torque of bolt, nut	——		△ ※		△			

Note： ※This item needs maintenance at first inspection.

5.4.11 Hose

table 1. hose

interval(hour)	inspection item	abnormality	remedy
daily	hose appearance	leaks (1)	replace
	hose end	leaks (2)	replace
	joint	leaks (3)	tighten, replace hose or replace o-ring
every 250 hours	hose appearance	crack (4)	replace
	hose end	crack (5)	replace
	hose appearance	strengthening material expose (6)	replace
	hose appearance	partly raised (7)	replace
	hose	bend (8)	replace
	hose	bend (9)	replace (use proper bending radius)
	hose and joint	deformed and corrosion (10)	replace



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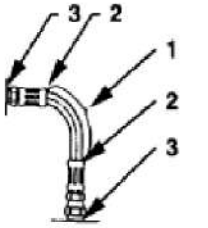

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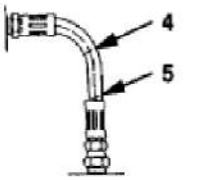

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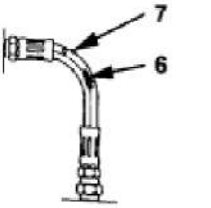

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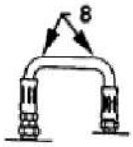

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5.4.12 Wearing Parts Table

Item	Number					Part Name	Qty	Replacement interval	Remark
	SWE50B	SWE60B	SWE70B	SWE80B	SWE90UB				
Engine oil filter	730403000123	←	←	←	←	Engine oil core	1	Every500	
Fuel filter	730403000051	←	←	←	←	Fuel prefilter core	1	Every 500	
	730403000052	←	←	←	←	Fuel oil main filter core	1	Every 500	
Hydraulic oil core	730403010028	←	←	←	730403000039	Oil return filter core	1	Every 500	
	730403000394	←	←	←	←	Air filter core	1	—	
Pilot filter	730403000432	←	←	730403000058	←	Pilot filter core	1	Every 500	
Air filter	730403000157	—	730402010012	←	←	Air outter filter core	1	—	
	730403000158	—	730402010011	←	←	air inner filter core	1	—	
	—	750201011265	—	←	—	Air main filter core	1	—	
Bucket	750601000001	←	750601000013	←	←	Cross bucket teeth	5	—	
	750601000005	←	750601000014	←	←	Bucket teeth base	5	—	
	750601000006	750601000019	750601000015	←	←	Bucket teeth pin	5	—	
	750601000024	←	750601000016	←	←	Left side teeth	1	—	
	750601000023	←				Right side teeth	1	—	
	701104014011	←	701103020018	←	←	Bolt	6	—	
	701406014002	←	701406020001	←	←	Nut	6	—	

5.4.13 Maintenance under Special Situation

Work condition	Maintenance instruction
Work in mud, water and rain.	● Check joint, bolt and nut for looseness and lost, and any signs of damages and leakage. ● After work, clean up mud, rock, sand adhered to machine. Check welds for damages, cracks and looseness. ● Execute daily lubrication and maintenance work. ● In the event that machine has to work in circumstances involves acid rain or corrosive stuff, flush parts being effected with fresh water
Seashore	● Check plug and all drain plug to ensure they are tighten securely prior to operation. ● After completing operation, flush machine with fresh water to remove salt. Carry out maintenance operation regularly to prevent corrosion.
Dusty and hot situation	● Clean up air filter and cartridge more frequently. ● Clean radiator and oil cooling fins to remove embedded dust and dirt. ● Clean up fuel suction cartridge and filter more frequently. ● Clean up frequently, especially the surface of alternator and starter rectifier.
In rocky situation	● Operate with extra care. Check chassis and track for damages and excessive wear out. ● Check joint, nut, and bolt for looseness, damage and lost. ● Check bucket or breaker for damage and excessive wear out more frequently. ● Fix a upper or front frame to prevent hazard due to falling objects, if necessary.
In cold weather	● Use premium oil with low viscosity according to ambient temperature. . ● Use proper anti-freezing according to ambient temperature. ● Charge battery a little time earlier than normal situation. The electrolyte will freeze with insufficient charging. ● Remove mud adhered to machine to prevent damages to machine due to freezing.
In existence of falling objects	cab：Add falling objects prevention device to prevent cab from damaging and avoid operator injury if necessary. .

5.4.14 Protective Measures for Long Time Storage

If the machine will be out of use for more than one month, you should carry out following protective steps to ensure the performance of machine won't be suffered during storage period.

Protective steps for extended period storage

	Content
Clean machine	Clean machine body completely, repair any problem.
Add lubricant and grease lubricant	Check whether lubricant is insufficient or dirty or not. Add grease lubricant to lubrication demanded parts. Wipe lubricant on the possible rusting parts.
Battery	Remove battery, charge sufficiently, then store.
Cooling water	Add antirust in the water, and add antifreeze if the cooling water may be frozen; or exhaust cooling water, place the "no water in radiator" label in cabin after water exhausted.
Dustproof and waterproof work	Store the machine in dry garage and cover it.
Tools	Check and repair, and then store.
Lubrication operation— Engine idle at low revs for a few minutes	The parts will rust if the lubricant velum is demolished, causing abnormal abrasion in next operation. In order to prevent this happening, run the machine at least once every month to lubricate parts. Meanwhile, check cooling water and lubricant level.

Note

- "Lubrication operation" means warming up machine and repeat travel, swing, digging operation 2 or 3 times.
- Even if the machine is out of use, the lubricant and grease lubricant will also be aging. So, the machine should be get sufficient inspection before used.

5.5 MACHINE MAINTENANCE SCHEDULE

5.5.1 Daily Maintenance (Every 8 Hours)

Carry out the following maintenance operation before starting machine daily (8 hours)

5.5.1.1 Filling grease of work attchment

(1) boom cylinder foot ,1 place.

SWE80 boom cylinder foot ,2 places

(2) boom foot pin (2 places)

(3) arm cylinder foot pin (1 place)

(4) boom cylinder piston rod end (1 place)

(5) boom – arm connecting pin (1 place)

(6) arm cylinder piston rod end (1 place)

(7) bucket cylinder foot pin (1 place)

(8) arm –link connecting pin(1 place)

(9) arm – bucket connecting pin(1 place)

(10) link connecting pin(1 place)

(11) bucket cylinder rod end.(1 place)

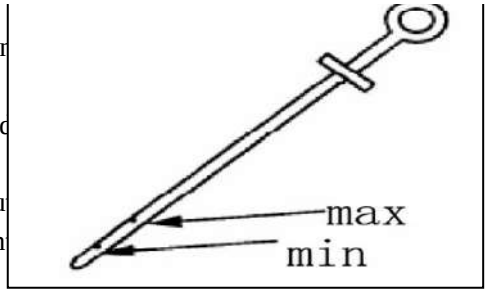
(12) bucket – link connecting pin(1 place)

5.5.1.2 Check Engine Oil Level

Warning

- The parts and oil are at high temperature after engine stopped, and may cause serious burns. Wait un temperature goes down before starting operation.

- Open engine cover, pull dipstick out. Use clean rag remove oil trace on dipstick.
- Re-insert dipstick in position; pull it out to check the mark. The mark should be between the lines of MIN a MAX. if not, drain or refill.
- If the oil level does not reach scale L, open port to refill.
- If the oil level overflows scale H, loosen drain plug to drai redundant oil.
- With oil level checked, insert dipstick into the hole an secure port cover.



Note: The oil level checking operation should be carried ou 10 minutes after shut-down. If checking oil level the momen machine has just been shut down, incorrect number will be read.

5.5.1.3 Check Coolant Level

Warning

- There is high pressure in existence inside the radiator, and coolant temperature is still high, after engine is stopped. Do not open the refilling port cover at this time. Wait until temperature goes down, and then gradually loosen cover to release pressure. Failure to do so will cause serious burn.

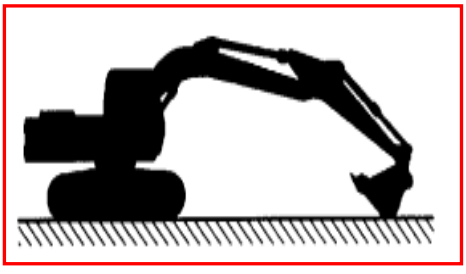
- Open left inspection door of the machine, inspect coolant level of secondary tank. The level must be between the lines of HIGH and LOW. If not, drain or refill.
- If the secondary water tank is empty, add coolant to radiator first before adding coolant to secondary water tank.

5.5.1.4 Check Hydraulic Level

【Important】

- Do not run engine with empty hydraulic oil tank.

- With arm cylinder folded and bucket cylinder extended to their full stroke, lower bucket to ground to stop the machine.
- Shut auto-idle switch to run engine unloaded at low speed for 5 minutes.



【Important】

- ◆ Improper engine shut-down will damage turbocharger.

- Set starting key to OFF position, stop the engine and remove the key from starting lock.
- Set pilot safety lock lever to LOCK position.
- Open inspection door (right back door) for main pump, check fluid level to ensure that hydraulic oil will be between fluid level scales. Otherwise Refill if necessary.

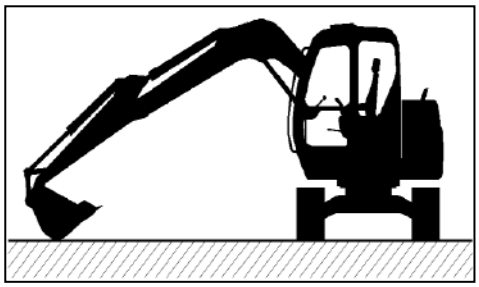
Adding Oil

Note

- ◆ There is pressure in hydraulic oil tank. Release pressure before opening oil fill cap.

- Release pressure, then remove oil fill cap on top of hydraulic oil tank to fill oil.
- Add oil and recheck fluid level.
- Lock oil fill cap, make sure oil return cartridge and suspension rod are positioned properly.

5.5.1.5 Drain Deposit In Fuel Tank



(1) To facilitate access, swing upper-structure 90°. Stop the machine at level ground as shown in fig.

(2) Lower bucket to the ground.

(3) Run engine unloaded at low speed for 5 minutes.

(4) Shut off engine and take out key.(before start the machine)

(5) Pull pilot control cut off rod to the the “lock”position

(6) Loosen drain valve underneath fuel oil tank to drain water and deposit,then close drain valve.

5.5.1.6 Check Hose and Tubes for Leakage, Interference Abrasion

Warning

- ◆ Pressurized fluid can penetrate skin causing serious injury.
- ◆ To prevent being injured, use a card board to search leakage. Be careful not to allow high-pressure fluid to come into contact with body.
- ◆ In case of accidents, contact experienced doctor for medical attention.

Warning

Exposed hydraulic oil and lubricant can cause fire and injury to person.

To avoid this hazard:

- Stop the machine to firm level ground, lower bucket to ground.
- Stop the engine, remove key from starting lock, set pilot safety lock lever to LOCK position.
- Check hose for any twist, abrasion, check hose clamp for looseness or lost. Check damages of cooler. Check flange for looseness, and oil leakage.
- When clamping, repairing or replacing any loosened, damaged, lost hose clamp, hose, pipe, oil cooler and its flange bolt, do not bend or hit high-pressure hose, do not install twist or damaged hose or piping.

5.5.2 Maintenance in Running-in Period (First 50 Hours)

5.5.2.1 Replace engine oil, oil filter element

1) Start engine to warm up oil without overheating.
2) Lower bucket to ground, stop the machine at level ground. Turn off auto-idle switch to run machine unloaded at low speed for 5 minutes.

【Important】

- ◆ Stopping engine improperly can cause damages to turbocharger.

3) Set starting key to OFF position, stop engine, remove the key from starting lock, set pilot safety lock lever to LOCK position.;
4) Open bottom cover underneath engine, place container under drain valve of engine oil pan. Open drain valve to drain engine oil.

Note

The engine oil might be hot, be care to handle it without being burned.

5) With engine oil drained, fasten and secure drain valve.

Replace engine oil filter element

1) Oil filter is positioned on the engine.
2) Use special wrench for filter to remove with anti-clockwise
3) Use special wrench for filter to rotate cartridge clockwise for 3/4 or 1 turn.

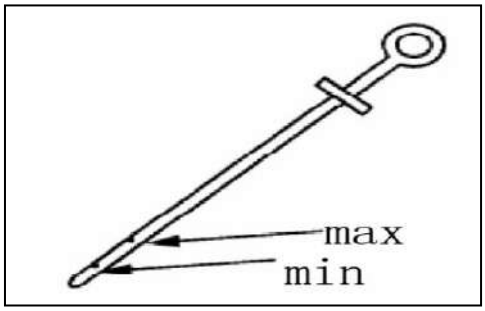
Pay attention not to over fasten.

Replace engine oil

4) Fill with oil through oil fill cap and check oil fill volume until specific scale position on dipstick is reached.

5) Cap oil filling port.

6) Start engine; run it unloaded at low speed for 5 minutes.



7) Check engine oil pressure indicator (red) on monitor to make sure it goes off. If it's still on, stop engine immediately and identify the cause.

8) Check drain valve for any leakage.

9) Check dipstick for oil level.

5.5.2.2 Drain Water and Deposit in Water Separator

1) Water separator is located in right side of engine.

2) Loosen drain valve located under water separator to drain water and deposit. Fasten drain valve the moment clean diesel oil is discharged.

3) Note: With water drained, it's necessary to bleed air from fuel system.

5.5.2.3 Change Fuel Filter

Note

- To be safe and environmental friendly, use container to collect waste oil, do not drain the oil to ground, ditch, river, pond or lake. Dispose of waste oil properly.
- After work, engine temperature is still high. After replacing the oil filter, wait for the engine to cools down.
- Keep flame or spark away from fuel.

1) Place a container under filter to collect fuel.
2) Use filter wrench to rotate cartridge counter-clockwise to remove it.
3) Clean filter holder, fill new filter with clean fuel, apply a layer of clean fuel on packing surface.
4) Position new filter to filter holder, fasten cartridge by hand

until packing surface contacts sealing surface of filter holder.

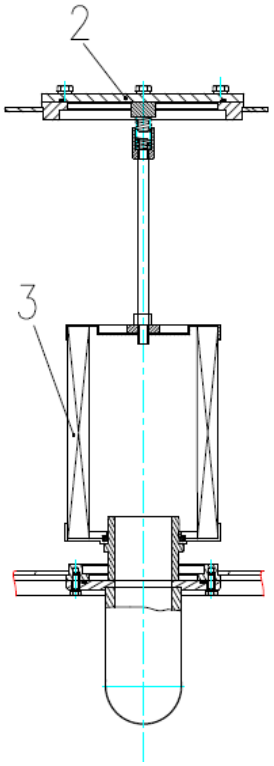
5) Use wrench to fasten 2/3 turns. Pay attention not to over tighten.

Note: With filter replaced, it's necessary to bleed air from fuel system.

5.5.2.4 Clean Oil Suction Filter

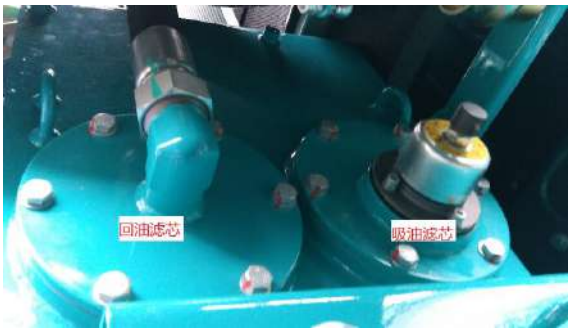
Warning

- With engine shut, parts and oil are at high temperature which may lead to serious burns. Wait until temperature cools down before starting maintenance operation.
- There is pressure in hydraulic oil tank. Release pressure first before opening oil fill cap on top of hydraulic oil tank.



1) To facilitate access, swing upper turret 45 °, then stop excavator at level ground.
2) Position excavator with arm cylinder completely retracted and bucket cylinder completely extended.
3) Lower bucket to the ground, run the engine unloaded at low speed for 5 minutes. Stop the engine, remove key and set pilot control lever to LOCK position.
4) Clean up upper hydraulic oil tank to prevent dirt getting into hydraulic system. Press lock cap to release internal pressure.
5) Remove hydraulic oil tank cover 2.
6) Remove oil suction filter and suspension bar unit 3. Rinse filter. To replace filter, fix new filter on suspension bar, tighten bolt at torque: 14.5 to 19.5 Nm (1.5 to 2 kgf ṁ).
7) Install oil suction filter and suspension bar unit 3, make sure filter is positioned on the opening properly.
8) Install tank cover 1, make sure filter and suspension bar are place in position. Tighten bolt at torque: 49 Nm (5kgfm).
9) Start engine; run it unloaded at low speed for roughly 15 minutes to bleed air in main pump and hydraulic system.
10) Shut down engine.

5.5.2.5 Clean Oil Returning Filter

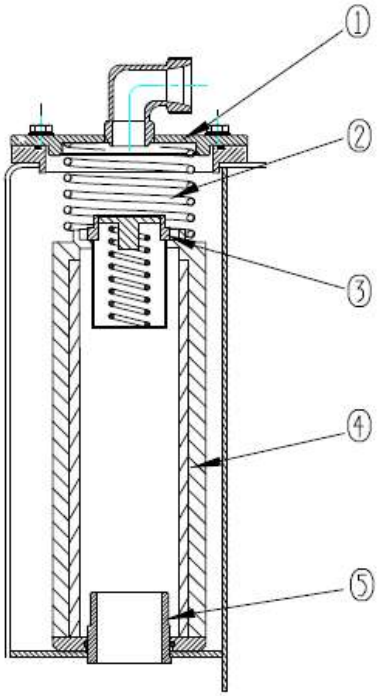


Warning

With engine shut, parts and oil are still at high temperature. Wait for engine to cool down, before starting operation.

- There is pressure inside hydraulic oil tank. Release pressure before opening oil fill cap located on top of hydraulic oil tank.

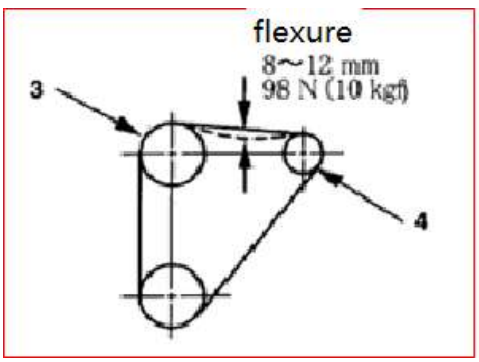
- To facilitate access, swing upper turret 90 degree, then stop the machine at level ground.
- Position excavator with arm cylinder fully retracted and bucket cylinder fully extended.
- Lower bucket to ground, run engine unloaded at low speed for 5 minutes, then stop the engine, remove key, set pilot control lever to LOCK position.
- Clean up upper hydraulic oil tank to prevent dirt getting into hydraulic system, press down lock cap to release internal pressure.
- Loosen 6 bolts to release internal pressure, and remove cap (1) at which moment, the cap might be ejected under spring (2) force, therefore it's necessary to hold the cap down when removing these bolts.
- Pull out upper end of bar (3), remove spring (2) and filter (4).
- Remove dirt adhered on filter (4), rinse it with fresh diesel oil or washing oil. If the filter (4) is damaged, replace it with new one.
- Reinstall filter (4), insert it to the bulge (5) in oil tank.
- When installing, the bulge under cap (1) must secure spring (2), then use bolt to fasten it.



5.5.2.6 Check and Adjust Fan Tension

【Important】

- Excessive tension on belt will accelerate the wear-out of bearing and belt. Loose belt may cause incomplete battery charging, engine overheating, belt abnormality and premature wear-out.



11) Press at a point midway between fan belt pulley and engine belt pulley to check fan belt tension.

12) The deflection A should be 8-12mm, when the pressing with a pressure of 10kgf（98N）.

13) If the tension is not within specific range, loosen bolts on adjust plate and engine bracket, move engine until proper

tension value is reached.

14) Tighten the bolts on adjust plate and engine bracket.

Note: Please replace belt if necessary.
With new belt installed, make sure to run engine at low speed for 3-5 minutes. Next, check and adjust belt tension to ensure that belt is position properly.

5.5.3 If Maintenance is Needed

5.5.3.1 Clean Air Filter Cartridge

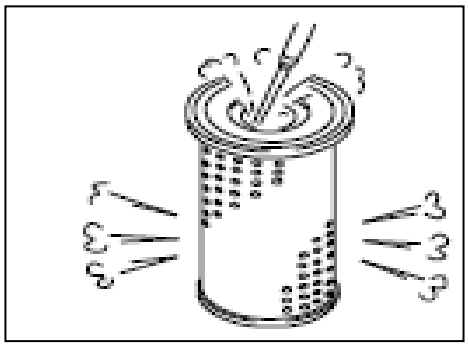
- In case of filter clogging, indicator on monitor will flash to notify you to clean air filter.
- Stop the machine at level ground, lower bucket to ground.
- Stop auto-idle switch to run the engine unloaded at low speed for 5 minutes.

【Important】

- ◆ Stopping engine improperly will cause damages to turbocharger.
- Set starting key to OFF position, stop the engine and remove the key from starting lock. Set pilot safety lock lever to LOCK position.
- Loosen buckle (1) to remove air filter end cover.
- Remove outside filter (2), clap slightly with hand. Never hit it with hard stuff.

Note

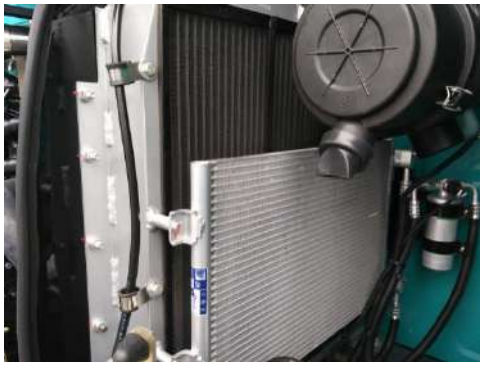
- ◆ Minimize pressure of compressed air (<0.2 MPa, 2kgf/cm^2), let go of personnel around to avoid scattered metal particles, wear personal protective articles including goggles and protective glassed.
- Use compressed air to clean outside filter (1), following the wrinkle direction to blow air outward.
- Clean up the inside filter.
- Install outside filter (1), end cover, fasten clamp buckle (2).
- Start engine; run it unloaded at low speed. Check filter clogging indicator on monitor. If this indicator illuminates, shut engine immediately and replace outside filter (1).
- Replace internal filter (3) the moment outside filter (1) is replaced.



5.5.3.2 Clean Up Cooler

After the machine works a certain period of time, the cooler surface will be covered with dust or other foreign material which will influence radiating effect of cooler. It should be

cleaned in time.



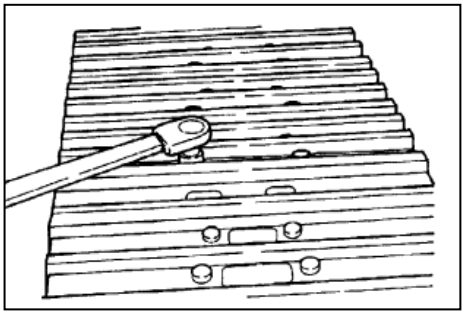
- Open right side door of machine hood;
- Loosen the mounting bots located on left side of condenser, open up condenser of A/C.
- Use compressed air (below 0.2 MPa) or water to rinse condenser.
- Remove the strainer (if present) in front of radiator for cleaning up.
- Use compressed air (below 0.2 MPa) or water to rinse cooler.
- Reinstall the front strainer (if provided) and condenser of A/C.

Note: Do not remove air conditioning piping, failure to do so will cause coolant leakage and lead to air conditioning malfunction.

5.5.3.3 Checking and Fastening Track Bolt

If operating machine with bolts loosened, there is hazard that the bolts will rupture. Therefore the loosened bolts should be fastened.

Tightening method



- Track shoe

1) Tighten at torque 490 ± 49 N m (50 ± 5 kgf m, 360 ± 36 lbft), then check to make sure that nuts contact with track link surfaces securely.
2) After checking, retighten 120° ± 10°.

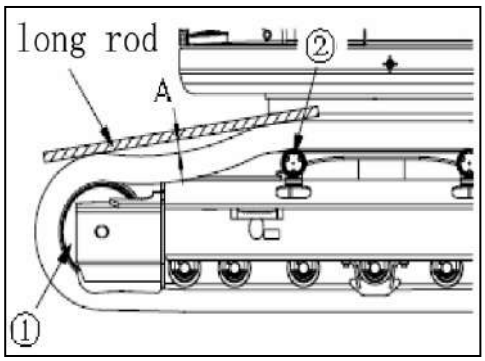
- Rubber block (if mounted)

1) Tighten at torque: 549 ± 59 N m (56 ± 6 kgf m, 405 ± 43 lbft).
2) After tightening, check to ensure that nut and track link contact surface contact against each other securely. .

Tighten Sequence

- Tighten bolts in the sequence given in right fig.
- With bolts tightened, check bolts and track link mating face to ensure they contact securely.

5.5.3.4 Check Track Tension



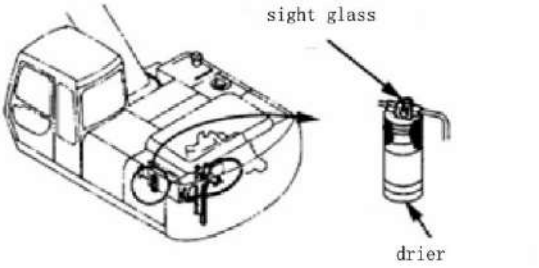
- Run engine at low idling, move the machine forward a distance equals to the length of track on ground. Then stop the machine.
- As shown in right fig, choose a straight long rod; place it on track over idler (1) and carrier roller (2), measure the max distance "A" between upper surface of track and bottom surface of the rod.

  Standard deflection "A" should be 20-28 mm (0.8-1.1 in).
- If the track tension is not at standard value, adjust it in the following manner:

  1) Pump in grease through grease fitting(2) with a grease pump.(pump fitting (2) and plug screw (1) are integral

  2) To check track to evaluate the proper tension of tra Gradually move machine forward（7-8 m（23 ft - 2(3 in）.

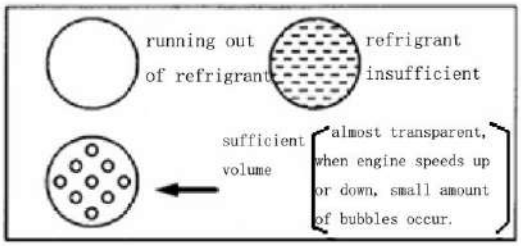
  3) Recheck track tension, if the tension is impro re-adjust it.



Warning

- ◆ There is a hazard that plug screw may fly out under h lubrication grease pressure. Never loosen plug (1) over one turn. (1).
- ◆ Do not loosen any parts other than plug screw (1). Do attempt installation facing plug screw (1).

illustration



5.5.3.5 Check A/C Cooling Medium Level

Warning

- ◆ In case that cooling medium gets into eyes or makes contact with hands, this may cause blindness or freezing injury, therefore do not contact cooling medium directly.
- ◆ Do not loosen any parts of cooling medium piping.
- ◆ Do not allow any naked flame to reach the position with cooling medium leakage.

If the cooling medium is insufficient in A/C system, the cooling performance of air conditioning will be bad.

- If setting engine to idle at high speed, and operating air conditioning to extra refrigerating state, there must be small amount of bubbles in inspection glasses which is fixed on condenser reservoir.
- There are bubbles flowing in cooling medium (continuous bubble flowing)：Low cooling medium level.

【Important】

- ◆ If the engine runs at low cooling medium level, this may

cause damages to compressor.

- Bubbles indicate low cooling medium level, please contact SUNWARD distributor to add cooling medium.

Inspection during idle seasons

If the air conditioning system is kept inactive for a long time, perform a operation on cooler for 3-5 minutes every month to lubricate each part of the compressor.

5.5.3.6 Check washer fluid level

- Check reservoir for fluid level, add fluid if necessary.
- When adding fluid, pay attention not to allow any dusts to get in.

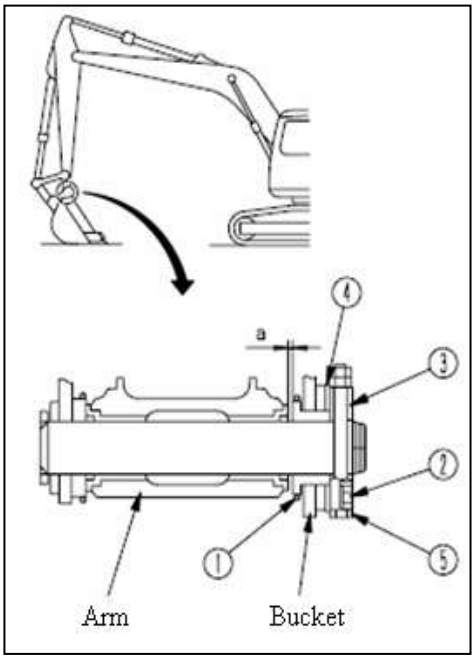
Mixture ratio of pure washer fluid and water

The mixture ratio differs according to the ambient temperature. So dilute the washer fluid with water following the table below.

Operation area	Mixing ratio	temperature
In general	Pure detergent1/3：water 2/3	-10 ℃ (14 ℉)
Cold area winter	Pure detergent 1/2： water 1/2	-20 ℃ (-4 ℉)
Extreme area winter	Pure detergent	-30 ℃ (-22 ℉)

Note: Pure detergent are divided into 2 categories： -10 ℃（14 ℉)(general use) and -30 ℃（-22 ℉)(cold area use). Select according to the area and season.

5.5.3.7 Adjust Bucket Clearance



Warning

- ◆ When adjusting, it's dangerous if work equipment is moved by mishandling.
- ◆ Set work equipment at stable state, shut engine and lock up safety lock lever.

- Set work equipment in posture as shown in right fig.
- Stop engine, set safety lock lever to LOCK position.
- Remove O-ring of link to measure clearance "a".

Note：

Move bucket to one side, or measure overall clearance at

one place, the measurement is a little bit easy. (The position shown in fig is left position).

It's easy to measure correctly if using pin gauge.

- Loosen 4 fixed bolt (2) and plate (3).
- Remove shim (4) according to clearance "a" being measured in previous step.

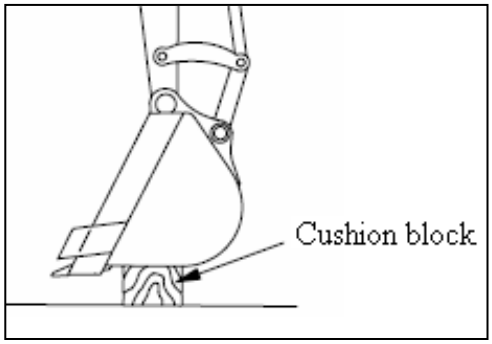
【for instance】

For clearance of 3mm, remove 1 pcs shim of 1.0mm and 1 pcs shim of 0.5mm. The clearance will become 0.5 mm. for shim (4), use two types of 1.0mm and 0.5mm.

If the clearance is smaller than one shim, do not attempt any maintenance operation.

- Tighten 4 bots (2).

If it's difficult to tighten bolt (2), to facilitate tightening, pull out fixing pin bolt (5).



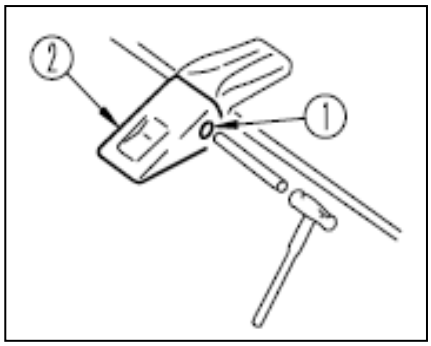
5.5.3.8 Replace Bucket Teeth.

Replace bucket teeth before bucket teeth holder wears out.

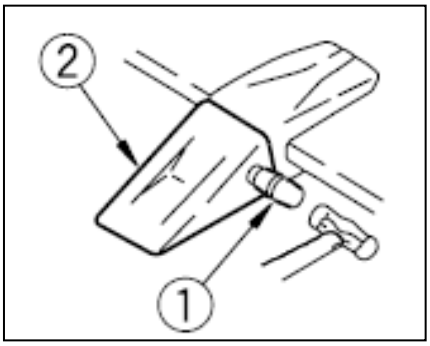
Warning

It's dangerous if the work equipment moves by mistake when the teeth are being replaced. Set the work equipment in s table condition, stop the engine, and then set the safety lock levers securely to the LOCK position.

- ◆ If the lock pin is knocked out by force, there is hazard that pins may fly out. Check to ensure nobody is in the surrounding area.
- ◆ During replacement operation, there is hazard of flying out pieces. So wear protective glasses, gloves, and other protective equipment.



- Lower the bottom surface of the bucket on a block, check that the work equipment is in a stable condition, then set safety lock lever to the LOCK position.
- Place a metal rod (diameter is a little smaller than pin) against the back of the pin), use hammer to knock out pin (1), then remove bucket teeth (2).
- Clean mounting surface, place new bucket teeth (2) to teeth holder, push pin (1) partly into it by hand, then use hammer to knock in lock pin to position it to bucket holder.



5.5.4 Every 50 hours

Carry out the following maintenance operation every 50 hours service time.

5.5.4.1 Check and Adjust Track Tension

For detail, please refer to chapter 5.5.3.4.

5.5.4.2 Drain Water and Deposit From Water Separator

For detail, please refer to chapter 5.5.2.2.

5.5.5 Every 100 Hours

Carry out the maintenance for every 50 hours service at the same time.

5.5.5.1 Check and adjust fan belt tension

For detail, please refer to chapter 5.5.2.7.

5.5.6 Every 250 hours

Carry out 50 hours service at the same time.

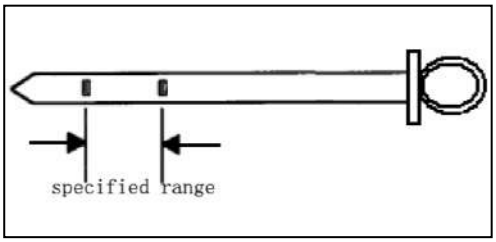
5.5.6.1 Checking swing redactor gear oil level

- Stop the machine at level ground.
- Shut auto-idling switch to run the engine unloaded at low temperature for 5 minutes.

【Important】

- Stopping the engine improperly may damage turbocharger.

- Set start key to OFF position, stop the engine, remove the key from starting lock, set safety lock lever to LOCK position.

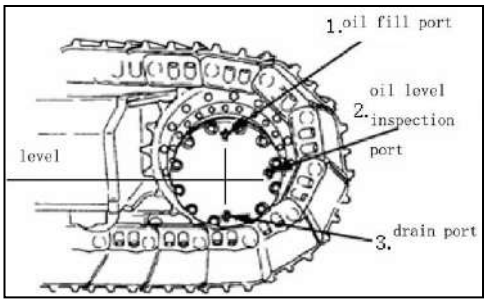


Note

- After completing work, the gear oil temperature might be very high, wait for temperature to cool down.

- Pull out dipstick of swing redactor, wipe off oil trace, reinsert it and pull out again, the oil mark should be between the two scales.
- If necessary, remove oil fill cap to add gear lubricating oil. Check oil level again.

5.5.6.2 Checking Travel Redactor Gear Oil Level



- Stop the machine at level ground, set the connect line of travel redactor oil fill port 1 and drain port 3 is vertical from horizontal level.
- Shut auto-idle speed switch, run the engine unloaded at low speed for 5 minutes.

【Important】

- ◆ Stopping the engine improperly may damage turbocharger.

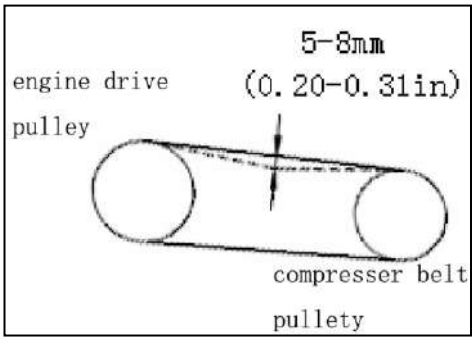
- Set start key to OFF position, stop the engine, remove the key from starting lock, set safety lock lever to LOCK position.

Note

- ◆ After completing work, gear temperature may be very high. Wait for temperature to cool down before loosening oil fill plug of fill port 1. Pay attention that to keep body and face away from oil fill port 1 during operation.

- With gear oil cooled down, gradually loosen oil fill port plug to release pressure.
- Remove plug of oil fill port 1 and inspection port 2, check through inspection port 2 that gear oil level must be within the range of 10mm under inspection port2.
- If necessary, add lubricating gear oil through oil fill port 1, and then recheck oil level.
- Reinstall plug screw of oil fill port 1 and inspection port 2.
- Check the gear oil level on another side of travel redactor with the same manner.

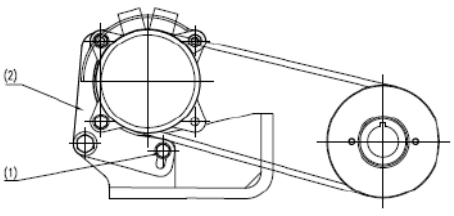
5.5.6.3 Check, adjust air conditioning compressor belt tension.



Inspection

The deflection should be 5 to 8mm, when pressing at a point midway between drive belt pulley and compressor belt pulley with a finger pressure of 58.8N(6kgf).

Adjust



- Loosen bolts (1).
- Pull adjusting screw blot （2）, make deflection of belt to be 5-8 mm （about 58.8N（6 kgf））.
- Fasten bolts (1).
- Check if belt pulley is broken, and if V groove and V belt are wearing. Especially inspect V belt do not contact with bottom of V groove.
- If belt is stretched, and has no adjusting allowance or cut or

split exits, please change belt.

- When adjusting new belt, after one hour's operation, please adjust it again.

5.5.6.4 Clean air filter cartridge

- Stop the machine at level ground, lower bucket to ground..
- Shut auto-idle speed switch to run engine unloaded at low speed for 5 minutes.

【Important】

◆ Stopping the engine improperly may damage turbocharger.

- Set start key to OFF position, stop the engine, remove the key from starting lock, set safety lock lever to LOCK position.
- Loosen clamp buckle (2) to remove air filter front cover.
- Remove outside filter (1), clap slightly by hand, never hit with hard object.

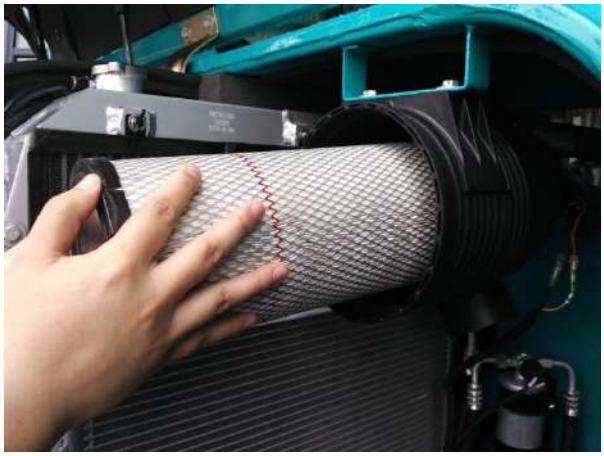
Note

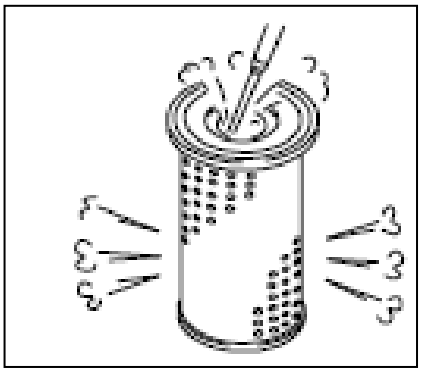
◆ Minimize pressure of compressed air (<0.2 MPa, 2kgf/cm^2) , let go of personnel around to avoid scattered broken pieces, wear personal protective articles including goggles and protective glassed.

- Use compressed air to clean outside filter (1), following the wrinkle direction to blow air outward.
- Clean up the inside filter.
- Install outside filter (1), end cover, fasten clamp buckle (2).
- Start engine; run it unloaded at low speed. Check filter clogging indicator on monitor. If this indicator illuminates, shut engine immediately and replace outside filter (1).
- Replace internal filter (3) the moment outside filter (3) is replaced.

5.5.6.5 Checking hose and piping leakage, interference wear-out.

For detail, please refer to chapter 5.5.1.6.





5.5.7 Every 500 Hours Service

Carry out EVERY 50 HOURS SERVICE and EVERY 100 HOURS SERVICE at the same time.

5.5.7.1 Greasing Ball Track of Swing Bearing

- Stop the machine at level ground, lower the bucket at level ground.
- Shut auto-idle speed switch, run the engine unloaded at low speed for 5 minutes.

【Important】

- ◆ Stopping the engine improperly may dam turbocharger.

- Set start key to OFF position, stop the engine, remove key from starting lock, set safety lock lever to LC position.
- Pump in grease through 3 grease fittings to swing bea ball track.
- Start engine, lift bucket, and swing upper-structure a degree.
- Repeat 3 times from step 3 until lubricating grease overflows from swing bearing seal.

5.5.7.2 Lubricate Swing Mechanism

- Stop the machine at level ground, lower the bucket to ground.
- Stop auto-idle switch, run the engine unloaded at low speed for 5 minutes.

【Important】

- ◆ Stopping the engine improperly may damage turbocharger.

- Set start key to OFF position, stop the engine, remove the key from starting lock, set safety lock lever to LOCK position.
- Loosen 2 bolts of grease fill port cover located on front part of turret. Then remove grease fill port cover (1).
- Check that grease height in the position where pinion passes by should be at least 14mm (0.6in), and free of pollution; add 0.5kg lubricate grease to reach standard height if necessary.
- Check the color of the grease, in case of white, change it.
- Drain port locates around central swing joint under lower carriage frame.

5.5.7.3 Replace Engine Oil, Oil Filter

For detail, refer to chapter 5.5.2.1.

5.5.7.4 Replace Fuel Filter

For detail, refer to chapter 5.5.2.3.

5.5.7.5 Replace Fuel Preliminary Filter

For detail, refer to chapter 5.5.2.4.

5.5.7.6 Clean Up Cooler

For detail, please refer to chapter 5.5.3.2.

5.5.8 Every 1000 Hours Service

Carry out EVERY 50 HOURS, EVERY 100 HOURS and EVERY 250 HOURS, EVERY 500 HOUR at the same time.

5.5.8.1 Replace swing redactor gear oil

- Stop the machine at level ground.
- Stop auto-idle switch, run the engine unloaded at low speed for 5 minutes.

【Important】

Stopping the engine improperly may dama turbocharger.

- Set start key to OFF position, stop the engine, remove t key from starting lock, set safety lock lever to LOC position.

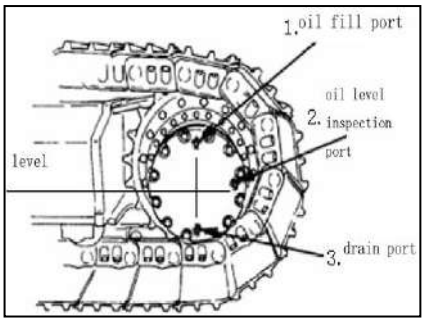
Note

After completing work, the gear oil temperature might very high, wait for temperature to cool down.

- Place a container under drain pipe to collect oil.
- Loosen drain plug to drain the oil, and then tighten t plug.
- Remove oil fill end cover, add specified gear lubricate oil
- Remove dipstick of swing redactor, wipe off oil with cle cloth, re-insert dipstick, then pull out again, the mark of should be between two scales.
- If the oil level doesn't reach mark L, add oil through oil fill port, if the oil level exceeds mark H, drain excessive engine oil and check oil level again.

5.5.8.2 Change Travel Redactor Gear Oil (2×4.7 L)

- Stop the machine at level ground, set the connect line of travel redactor oil fill port 1 and drain port 3 is vertical from horizontal level.
- Shut auto-idle speed switch, run the engine unloaded at low speed for 5 minutes.



【Important】

Stopping the engine improperly may damage turbocharger.

- Set start key to OFF position, stop the engine, remove the key from starting lock, set safety lock lever to LOCK position.

Note

- ◆ After work, the temperature of gear oil might be very high. Wait for the temperature to cool down before gradually loosen the plug of oil fill port 1. Keep face and body away from plug of oil fill port, during the process of work.

- With the oil cooled down, gradually loosen the plug to release pressure.
- Place a container under drain port3 to collect oil.
- Follow the given sequence to remove oil fill port 1, check port 2 and plug screw of drain port 3 and drain the oil.
- Check the o-ring on plug for damages. Replace it with new one if necessary.
- Tighten the plug of drain port 3.
- Add oil through oil fill port1, when the oil overflows from inspection port 2; tighten the plug of oil fill port 1 and inspection port 2.
- Replace travel redactor gear oil on the other side in the same manner.

5.5.8.3 Change Oil Returning Filter

Warning

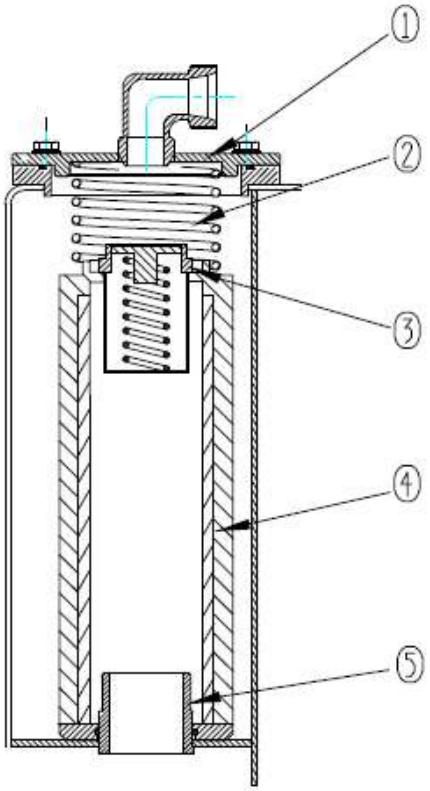
After the engine is stopped, parts and oil are still in high temperature which may result in serious burns. Wait for temperature to cool down.

- ◆ There is pressure inside hydraulic oil tank. Release pressure before opening oil fill cap located on top of hydraulic oil tank.

- To facilitate access, swing upper turret 90 degree, then stop the machine at level ground.
- Position excavator with arm cylinder fully retracted and bucket cylinder fully extended.
- Lower bucket to ground, run engine unloaded at low speed

for 5 minutes, then stop the engine, remove key, set pilot control lever to LOCK position.

- Clean up upper hydraulic oil tank to prevent dirt getting into hydraulic system, press down lock cap to release internal pressure.
- Clean up upper hydraulic oil tank to prevent dirt getting into hydraulic system, press down lock cap to release internal pressure.
- Pull out upper end of bar (3), remove spring (2) and filter (4).
- Check bottom filter shell for dirt, if any dirt is found, remove it. Pay attention not to let any dirt get into hydraulic oil tank.
- Place removed parts into fresh diesel oil or washing oil to rinse (except filter), replace with new filter.
- Reinstall filter (4), insert it to the bulge (5) in oil tank.
- When installing, the bulge under cap (1) must secure spring (2), then use bolt to fasten it.



5.5.8.4 Replace Pilot Oil Filter.

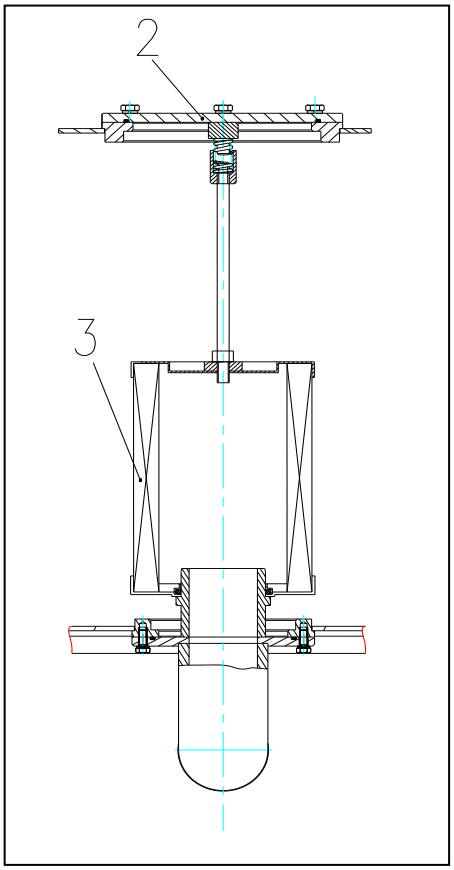
Warning

After engine is stopped, parts and oil are still in high temperature which may result in serious injury. Wait for temperature to cool down before stating maintenance operation.

- ◆ There are pressures in hydraulic system. Release the pressure before starting maintenance work.
- To facilitate access, swing upper turret 90 degree, then stop the machine at level ground.
- Position excavator with arm cylinder fully retracted and bucket cylinder fully extended.
- Lower bucket to ground, run engine unloaded at low speed for 5 minutes, then stop the engine, remove key, set pilot control lever to LOCK position.
- Rotate filter wrench counter-clockwise to remove shell (4) off mounting seat.
- Clean up mounting seat (1) and shell (4).
- Replace filter (2) and seal ring (3), apply a layer of fresh oil when installation.
- Secure shell (4) clockwise on headstock (1).

5.5.9 Every 2000 Hours Service

Carry out the maintenance for every 50hours, 100 hours, 250 hours, 500 hours and 1000hours service at the same time.



Replace oil suction filter and hydraulic oil

Note

- High pressure may build in hydraulic oil. Always release pressure and cool down oil temperature before attempting any maintenance operation.
- Determine replace interval based on the type of hydraulic oil. The interval differs according to different type of hydraulic oil.
- Determine replace interval based on work condition when using hydraulic breaker, the maintenance and replacement interval should be shortened by half.

- Swing upper-structure by 90 degree; stop the machine at firm level ground.
- Clean upper hydraulic oil tank to prevent dirt from getting into hydraulic system.
- Remove oil fill cap (2).
- Remove oil suction filter and suspension rod unit (4).
- Use pump to drain hydraulic oil from oil tank, remove drain plug (3) located on bottom oil tank to drain the residual oil to a container.
- Clean up hydraulic oil tank; re-install drain plug (3).
- Replace oil suction filter, re-install suspension rod unit (4), and oil fill cap (2).
- Add fresh hydraulic oil; install lock cover (1).
- Start engine, run it at low speed to bleed the air in main pump and system.
- Stop the engine.

5.6 Fault and Repair

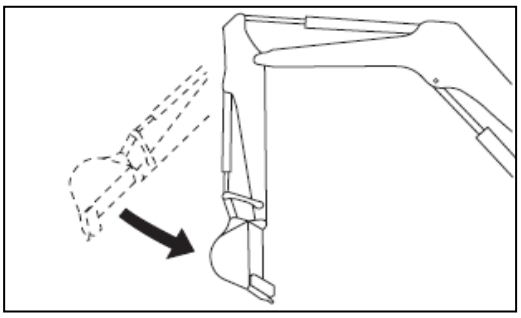


Figure 6.1.1

5.6.1 Beyond Faults

The following things are not belong to fault.

1.When arm retract, the speed of arm will be decreased when arm exceed and less than vertical place.

2. When bucket retract, the speed of bucket will be decreased when bucket teeth exceed and less than horizontal place.

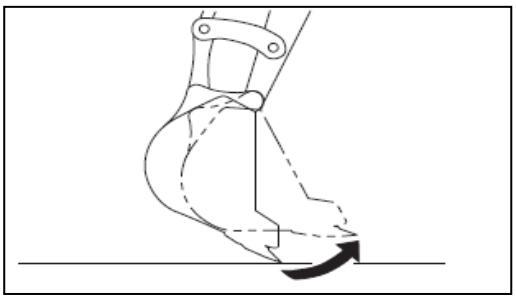


Figure 6.1.2

3. Suddenly stop at High speed or with low speed steep hill, travel motor makes noise.
4. When swing begins and finished,swing motor makes noise
5. When work attchment suffered to excessive resistance or travel to destination ,control valve makes noise.
6. Center of gravity of excavator tends to work attchment or it gets on flat car only through decrease boom to support excavator cause unable to support the excavator
7. Loading weight of bucket exceed rated value or the machine can not swing on the slope.

Note

- If the machine is kept in storage for long time, the oil film coated on kinetic surface may be damaged. After starting the machine. It's necessary to cycle individual kinetic surface for 2 to 3 times to let it completely lubricated.

5.6.2 Fault Examine and Repair

It must stop the machine If there is a fault or the machine can not operate, try to analysis and eliminate, there are many reasons for hydraulic system fault, try your best to according the following ways、items and subsequency to maintenance、adjustment and repair.

【Important】:

Please contact with Sunward about disassemble and repair hydraulic component of hydraulic system, user do not disassemble by themselves.

Note:

The fault and elimilate ways please refers to 《Yanmar Engine Operation and Maintenance Manual》,beacuse the fault code of electronic-control engine will be showed in the meter,please refers to the following fault code to check the reason.

Engine Fault and Maintenance

Engine		
Problem	**Cause**	**Possible remedy**
Engine runs but it's difficult to start or fails to start.	Out of fuel. Mistake type or brand of fuel or it's polluted. Defective wiring. Insufficient battery power Air filter clogging. Fuel filter clogging. Internal leakage in fuel system Fuel manual pump spring up Air gets into fuel system Start engine malfunction	Add fuel Bleed the air from fuel system Drain out the off-grade fuel. Fill with proper fuel Check starting circuit, clear the problem Charging or replace new battery. Clean filter or replace new filter. Clean up filter or replace with new filter. Bleed air in fuel system Check and repair leaks Push down and secure hand wheel Use manual pump to bleed air Replace start motor
Engine fails to make full use of power.	Air filter clogging Fuel piping clogging or oil deliver malfunction Improper fuel or pollution Fuel filter clogging. Ejection oil nozzle gets polluted or malfunction occurs The clearance of eject pump linkage out of spec	Clean or replace filter Clear the problem or replace piping. Drain the fuel and add proper fuel. Bleed air in fuel system Clean or change filter. Bleed air in fuel system Contact distributor Contact distributor Contact distributor
Engine fails to make full use of power.	Turbocharger malfunction Air bleeding failure Temperature of engine is too high or too low. Leakages in intake or exhaust air system	Contact with authorized distributor. Remove muffler and run the engine See "ENGINE OVERHEATING" or "over-cooling" Repair place with leakage

Engine overheating	Coolant level too low Improper coolant (e.g. water) Defective thermostat Defective temperature monitoring element Radiator clogging Defective fan Fan belt wears out or loosened. Defective belt pulley Defective cooling system Defective temperature sensor Ejection oil pump unpunctual Separator sponge peel off.	Add coolant Drain out, then replace with specified coolant Contact your designated distributor. Contact your designated distributor. Clean up radiator and front strainer Replace fan Adjust fan belt or replace. Replace belt pulley Clean up cooling system Change temperature sensor Contact your designated distributor. Replace separator sponge
Engine water temperature too low	Defective thermostat Defective temperature sensor Defective monitoring elements	Contact your designated distributor. Change temperature sensor Contact your designated distributor.
Too much engine oil consumption	Improper engine oil Engine oil leakages Excessive engine temperature. Engine internal elements wears out	Drain out and change to specified fuel Check oil delivery system and repair Check cooling system Contact your designated distributor
Exhaust gas is black （out of spec）	Improper fuel Intake system clogging Intake piping damage Intercooler clogging Ejection oil pump unpunctual Ejection nozzle gets polluted. Defective engine main block engine main body malfunction	Draining out and replace with proper fuel Check intake system replace clean up intercooler Contact your designated distributor Contact your designated distributor Contact your designated distributor

Exhaust gas is white	Improper fuel Engine temperature too low Defective thermostat Coolant leaks get into engine cylinder	Draining out and replace with proper fuel Run the engine to warm up Contact your designated distributor Contact your designated distributor
Turbocharger noise or excessive vibration	Insufficient lubrication of bearings. Turbine blades broken Bearing wear out Piping leakage Improper clearance between turbine and its case	Check turbocharger lubricate piping. Remove exhaust pipe and air intake hose for inspection Contact your designated distributor Check piping and repair Contact your designated distributor
Turbocharger joint leakage	Bearing or seal wear out, damage Excessive pressure in crank case Carbon clogging in oil return piping of turbocharger	Contact your designated distributor Check intake pipe to ensure its function Check, clean up

Engine Fault Diagnosed Code

J1939 *1			Description	Lamp Status			
SPN	SPN (hex)	FMI		MIL	RSL	AWL	PL
1210	4BA	4	Engine Fuel Rack Position Sensor Circuit Low			X	
		3	Engine Fuel Rack Position Sensor Circuit High			X	
91	5B	4	Pedal Position Sensor "A" Circuit Low			X	
		3	Pedal Position Sensor "A" Circuit High			X	
		2	Pedal Position Sensor "A" Circuit Intermittent				
		1	Pedal Position Sensor "A" Voltage Low			X	
		0	Pedal Position Sensor "A" Voltage High			X	
29	1D	4	Pedal Position Sensor "B" Circuit Low			X	
		3	Pedal Position Sensor "B" Circuit High			X	
		2	Pedal Position Sensor "B" Circuit Intermittent				
		1	Pedal Position Sensor "B" Voltage Low			X	
		0	Pedal Position Sensor "B" Voltage High			X	
		8	Pedal Position Sensor "B" Communication Error			X	
108	6C	4	Barometric Pressure Circuit Low	X			
		3	Barometric Pressure Circuit High	X			
		2	Barometric Pressure Circuit Intermittent				
1136	470	4	ECM Internal Temperature Sensor Circuit Low			X	
		3	ECM Internal Temperature Sensor Circuit High			X	
		2	ECM Internal Temperature Sensor Circuit Intermittent				
		0	ECM Internal Temperature Too High				X
110	6E	4	Engine Coolant Temperature Circuit Low Input			X	
		3	Engine Coolant Temperature Circuit High Input			X	
		2	Engine Coolant Temperature Circuit Intermittent				
		0	Engine Coolant Over Temperature Condition				X
1079	437	4	Sensor 5V Voltage "A" Circuit Low			X	
		3	Sensor 5V Voltage "A" Circuit High			X	
		2	Sensor 5V Circuit Intermittent				
168	A8	1	System Voltage Low				X
		0	System Voltage High				X
2209	8A1	4	Camshaft Position Sensor "A" Circuit		X	X	
2210	8A2	4	Auxiliary Rotation Speed Sensor Circuit		(Both)	(Ether)	
2049	801	4	Engine Fuel Rack Actuator Relay Circuit Open		X		
		3	Engine Fuel Rack Actuator Relay Circuit Shorted		X		
		2	Engine Fuel Rack Actuator Relay Circuit Intermittent				

J1939 *1			Description	Lamp Status			
SPN	SPN (hex)	FMI		MIL	RSL	AWL	PL
729	2D9	4	Air Heater Relay Circuit Open	X			
		3	Air Heater Relay Circuit Shorted	X			
		2	Air Heater Relay Circuit Intermittent				
2050	802	4	Cold Start Device Circuit Open	X			
		3	Cold Start Device Circuit Shorted	X			
		2	Cold Start Device Circuit Intermittent				
2059	80B	4	EGR Stepping Motor "A" Circuit Open	X			
		3	EGR Stepping Motor "A" Circuit Shorted	X			
2060	80C	4	EGR Stepping Motor "B" Circuit Open	X			
		3	EGR Stepping Motor "B" Circuit Shorted	X			
2061	80D	4	EGR Stepping Motor "C" Circuit Open	X			
		3	EGR Stepping Motor "C" Circuit Shorted	X			
2062	80E	4	EGR Stepping Motor "D" Circuit Open	X			
		3	EGR Stepping Motor "D" Circuit Shorted	X			
100	64	4	Oil Pressure Switch Circuit Open			X	
		1	Oil Pressure Too Low				X
2125	84D	4	Battery Charge Switch Circuit Open			X	
		1	Battery Charge Warning				X
2122	84A	0	Engine Coolant Over Temperature Condition (Coolant Switch ON)				X
107	6B	0	Air Cleaner Blocking				X
97	61	0	Oily Water Separator not Responding				X
190	BE	0	Engine Over Speed Condition		X		
638	27E	4	Engine Fuel Rack Actuator Output Circuit Low		X		
		3	Engine Fuel Rack Actuator Output Circuit High		X		
		7	Engine Fuel Rack Actuator not Responding		X		
522725	7F9E5	12	High Speed CAN Communication Bus			X	
522726	7F9E6	12	Internal Control Module EEPROM Write Error			X	
2530	79E2	12	Internal Control Module Memory Check Sum Error		X		
1485	5CD	4	ECM Main Relay GND Shorted			X	
522727	7F9E7	12	Sub CPU Cyclic Redundancy Check Error			X	
		12	Sub CPU ACKnowledgement Error			X	
		12	Sub CPU Communication Error			X	
522728	7F9E8	12	ECM MAP Format Error		X		

Electrical System Fault and Maintenance		
Fault	**Reason**	**Possible Measures**
Starting motor continues to run after engine is started.	Start relay fails to disconnect or gets pulled in. Defective starting key	Replace starting relay or contact your distributor Contact your designated distributor
While engine is running, charging indicator illuminates.	Engine belt loosened or damaged. Belt pulley wear out Engine damaged Defective charging circuit Low voltage of battery	Adjust engine belt or replace Replace belt pulley Contact your designated distributor Check and repair Charge or replace battery
Display screen does not work	Fuse blown out Defective wire circuit Display screen damaged	Replace fuse Check circuit and repair Contact your designated distributor
All indicators do not work	Fuse blown out Defective wiring circuit Defective circuit board	Replace fuse Check circuit and repair，or Contact your designated distributor Contact your designated distributor
Individual indicator does not work	Bulb damaged Fuse blown out Defective wiring circuit	Change bulb Change fuse Check circuit and repair，or Contact your designated distributor
Abnormal fuel indication	Defective oil level sensor Defective wiring circuit Defective indicator	Check and repair, or replace Check circuit and repair, or Contact your designated distributor
Displayed temperature of coolant do not reflect real temperature	Defective temperature sensor Defective wiring circuit Defective indicator	Contact your designated distributor Check circuit and repair, or Contact your designated distributor Contact your designated distributor

Hydraulic System Fault and Maintenance		
Fault	**Reason**	**Possible Measures**
Hydraulic function becomes sluggish	Low hydraulic oil level Low hydraulic oil temperature Oil type do not match ambient temperature Low engine revs Main pump wear out Pilot oil circuit malfunction Main suction oil pump blocked	Add hydraulic oil until specified scale level is reached Warm up operation until hydraulic temperature reaches around 50℃. Use proper oil Adjust engine revs or contact distributor Contact distributor Contact distributor Contact distributor
Excessive hydraulic oil temperature	Improper oil Low hydraulic oil level Hydraulic oil polluted Radiator clogging Filter clogging pump suction pipe leakage main pump wear out safety valve improper adjustment on hydraulic element	Use proper hydraulic oil Add hydraulic oil to reach specified scale level Filter or drain out and refill with proper oil Clean radiator and front drainer Clean or replace filter Contact distributor Contact distributor Contact distributor Contact distributor
Hydraulic oil produces bubble	Suction piping leakage Piping twist or depressed mix water into oil improper oil improper oil volume, too high or too low	Contact distributor Check hydraulic piping Drain out and refill with proper hydraulic oil Drain out and refill with proper hydraulic oil Keep hydraulic oil within specified level range
Hydraulic cylinder acts but cant not lift loads	Main pump wear out Main safety valve low pressure Suction filter clogging Pump suction pipe leakage Hydraulic cylinder wear out and cause internal leaks	Contact distributor Contact distributor Clean or replace oil suction filter Check oil suction piping Replace piston ring or contact distributor

A/C Fault and Maintenance

Problem	Cause	Remedy
System noise	electric appliance connector loosen causes clutch abnormal	plug connector tightly or repair
	loosened belt	tighten it, if it wearout ,please replace it
	blower、fan blade of electric fan loosened	tighten it again
	blower、electric fan running abnormal	repair or replace
	bearing of compressor is destroyed	replace
	bearing of tension wheel is destroyed	replace
Can not refrigerate	fuse melted	Check whether short cut and relpace
	amplifier is destroyed	replace
	relay is not work	replace
	electric wire fault	repair or replace
	A/C switch/ manipulator fault	repair or replace
	no refrigerating fluid	leak hunting,repair,charging refrigerant
	system clogged	wash or replace
	loosened or breakaged belt	adjust or replace
	expansion valve fault	wash or replace
	compressor running is abnormal	repair or replace
	pressure switch fault	replace
sometimes is cold	circuit bad contact	check and repair
	loosened belt	properly adjust belt
	the cold adjustment of A/C switch is improper / manipulator refrigerating capacity setting is too little	adjust again/enlarge refrigerating capacity setting
	the system has too much water, inside the ice block	replace reservior dryer
Insufficient air	too much or lacking refrigerating fluid	eliminate or supplement
	lots of air in system	vacuumize charge refrigerating fluid again
	clutch slipped or brasion	repair or replace

conditioning	expansion valve partial clogged	wash
	expansion valve fault	replace
	dry bottle clogged	replace
	appearance of dustproof net or evaprator is too dirty	wash
	return air inlet of A/C is clogged	clean
	appearance of condenser is too dirty	wash
	compressor fault	repair or replace
	misuse manipulator, opened heating equipment	close warm mode
	hot water flow controller/ solenoid warm water valve fault or it jamed at the open position	Wash or replace
	warm water valve is open	close warm up valve
	manipulator fault can not control hot water flow controller/solenoid warm valve closed	replace
can not heating or insufficient heating	water temprature of engine is too low	use it when water temperature of engine is rising
	manipulator fault can not control hot water flow controller/ solenoid warm water valve opened	replace
	hot water flow controller/ solenoid warm water wire line fault	Repair or replace
	warm water flow controller/ solenoid warm water valve fault or warm water valve jamed at the closed position or samll position	replace
	warm water valve closed or opened a little	turn up warm water valve
	manipulator heat setting is too little	magnify heating capacity setting
	manipulator/ misuse control panel, opened refrigeration	close refrigeration mode/A/C switch
	surface of dustproof net is too dirty	wash
	return air inlet of A/C is clogged	clean

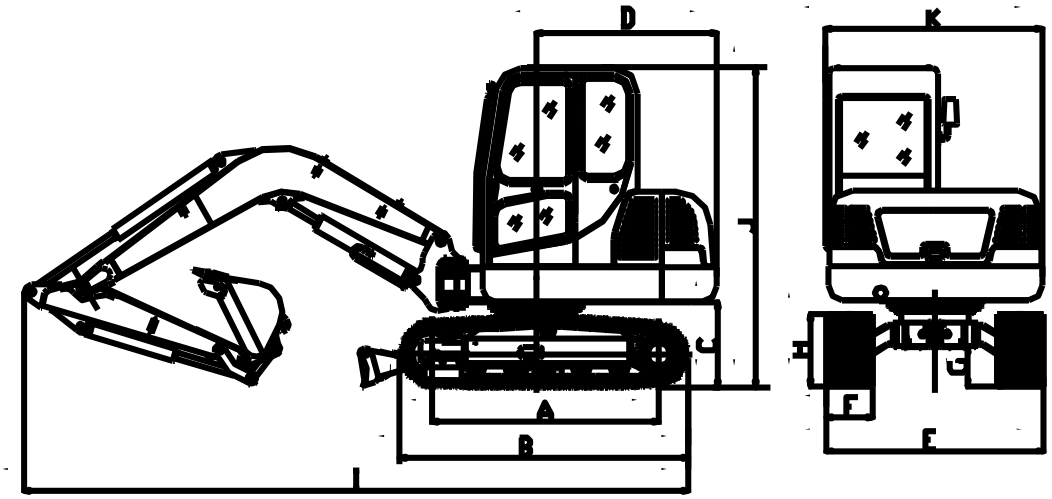
6. TECHINIAL SPECIFICATION

6.1 SWE50B TECHNICAL SPECIFICATION

6.1.1 Machine Specification

Machine specification		SWE50B
Operating weight	Equipped with rubber track	4890 kg
	Equipped with steel track	4960 kg
Standard bucket capacity		0.18 m3
Track shoe width		400 mm
Power plant		
Engine model		4TNV88-BSSU
Type		Direct injection, water cooled, 4 strokes
Number of cylinders		4
Displacement		2.19 L
Rated power/revs		25.8 kW/2200 rpm
Fuel tank capacity		115 L
Hydraulic system		
Main pump		2 variable plunger pump ,1 gear pump
Flow capacity		2×45+37 L/min
Work pressure		24.5/24.5/21 MPa
Front work attchment		24.5 Mpa
Travel		24.5 Mpa
Slewing		21 Mpa
Pilot pressure		3.9 Mpa
Hydraulic oil tank capacity		73 L
Performance specification		
Slewing speed		10.6 rpm
Travel speed		4.7/2.4 km/h
Max traction		37.1 kN
Max grade ability		30 °
Bucket max digging force		36.5 kN
Arm max digging force		30 kN
Boom deflection angle		R50 ℅L78 °

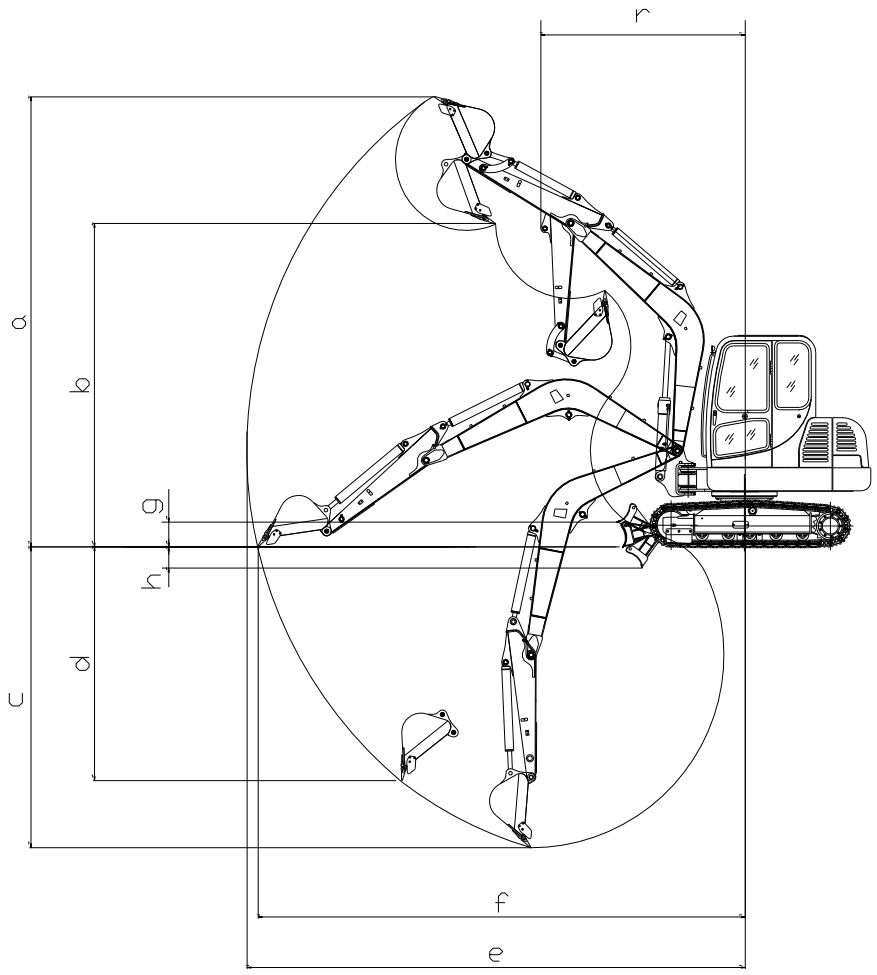
6.1.2 Boundary Dimension



Unit：mm

Machine Model		SWE50B
A	Wheel track	1900
B	Track total length	2425
C	Platform ground clearance	665
D	Platform slewing radius	1500
E	Chassis width	1850
F	Track width	400
G	Chassis ground clearance	310
H	Track height	575
I	Transport length	5560
J	Cab roof height	2570
K	Upper structure width	1900

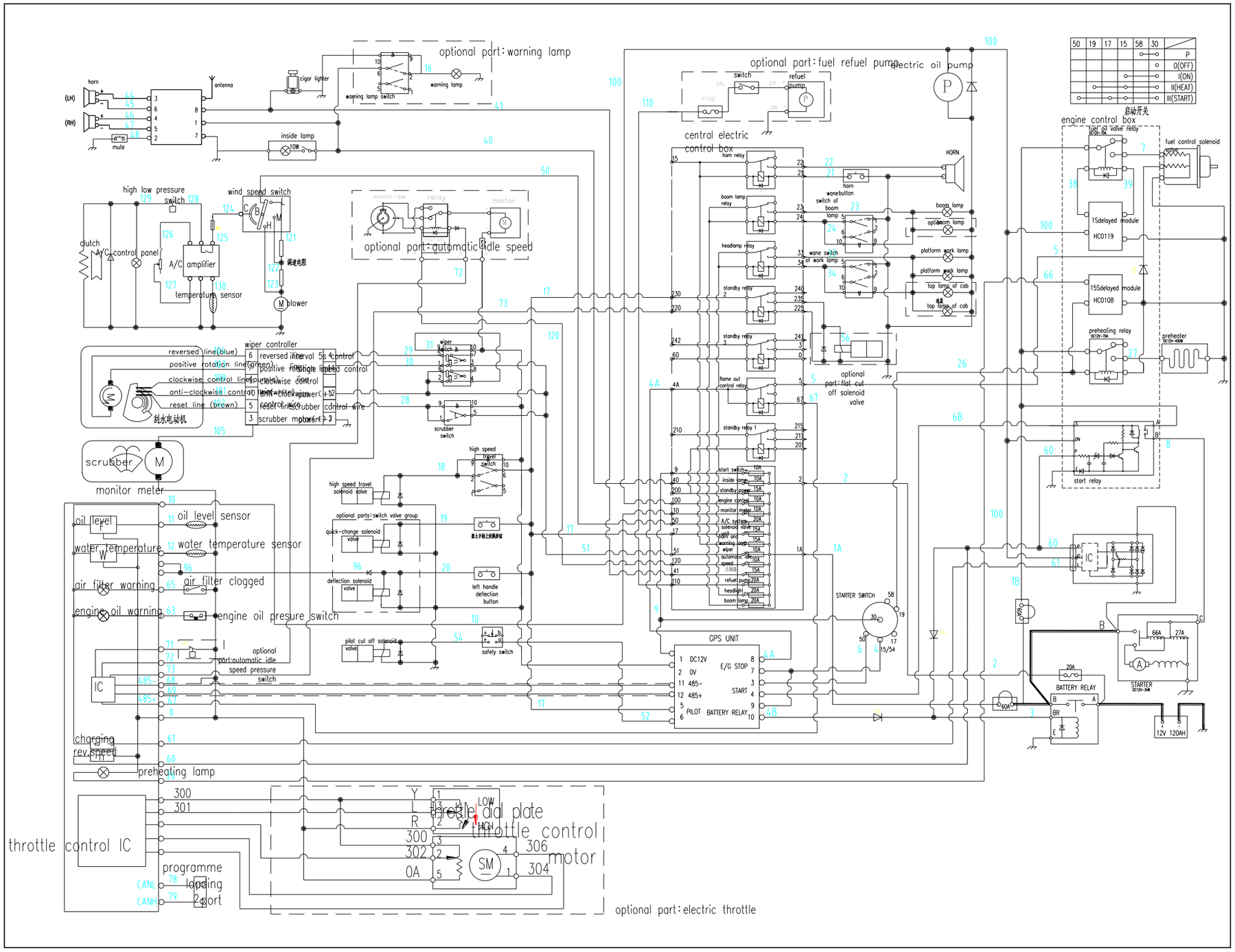
6.1.3 Work Specification



Unit: mm

Machine Model		SWE50B
a	Max digging height	5635
b	Max dumping height	3995
c	Max digging depth	3595
d	Max vertical digging depth	3060
e	Max digging radius	5920
f	Max reach at ground level	5785
g	Max.lifting height of Dozer blade	315
h	Max.digging depth of Dozer blade	405
r	Minimum swing radius	2210

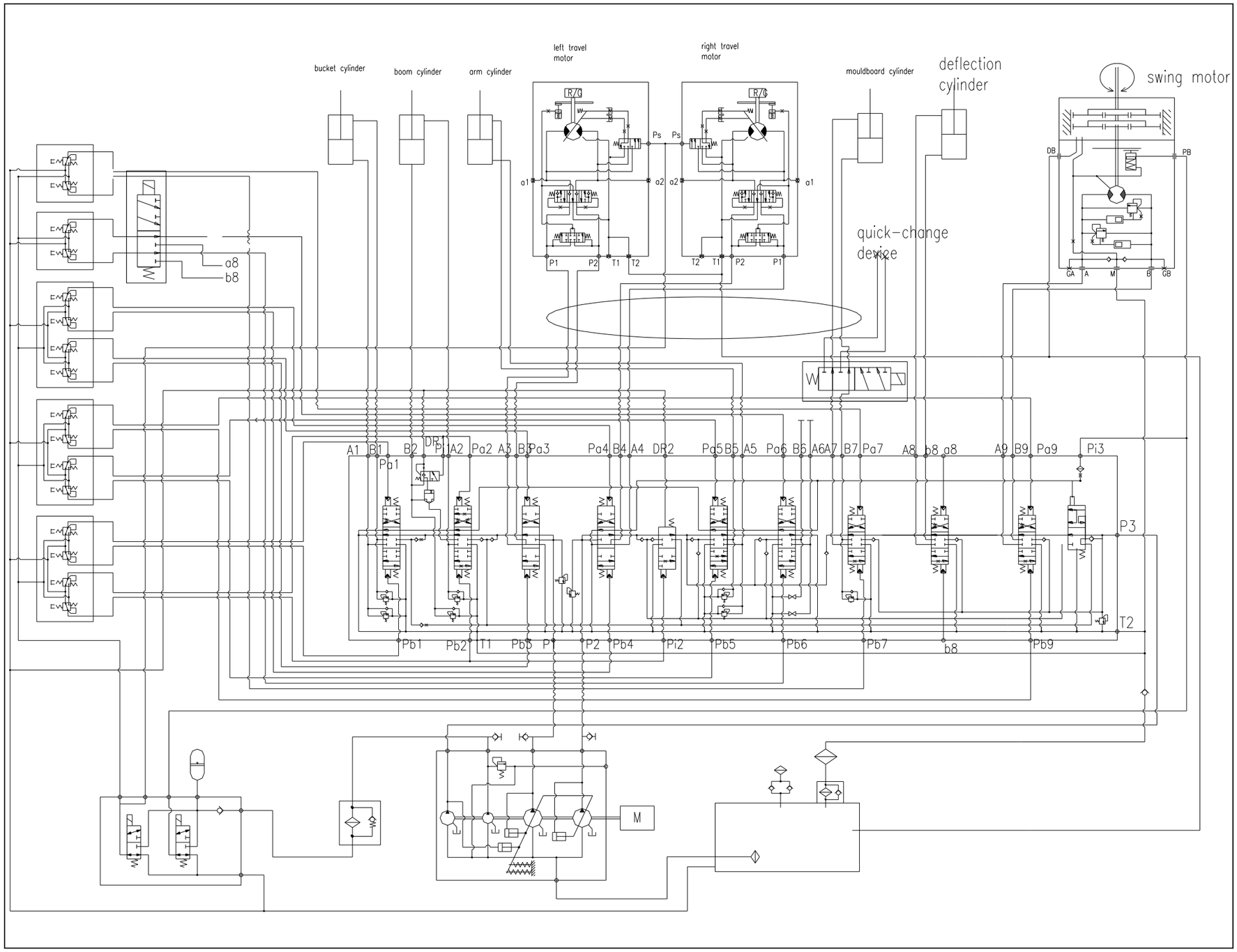
6.1.4 Circuit Diagram



6.1.5 Electrical Elements Table

N.O	NAME	N.O	NAME
1	Throttle servo-motor	27	Ignition lock
2	Safety relay	28	Monitor meter
3	Flameout control relay	29	Warm up relay
4	Fuel valve relay	30	Controller
5	Starter	31	Electric oil pump
6	Head light relay	32	Radio
7	Generator	33	Washer assy.
8	Water temperature sensor	34	Wiper controller
9	Air filter indicator	35	Horn
10	Overheat warning switch	36	Lighter
11	Engine oil pressure warning switch	37	GPS
12	Solenoid power switch	38	Electric control case assy.
13	Throttle drive plate	39	Connector
14	Work light	40	Single core plug
15	Oil level sensor	41	1S Delayed module
16	Micro-active switch	42	15S Delayed module
17	Press button switch end mounting frame	43	Standby relay 1
18	Press button switch mid-frame	44	Standby relay 2
19	Auto-idle switch	45	Standby relay 3
20	Quick selection switch	46	Horn relay
21	Front light switch	47	Fuel gasoline pump
22	Work light switch	48	18 Core junctor
23	Alarm light switch	49	22 Core junctor
24	Wiper switch	50	Warning lamp
25	Washer switch	51	Accumulator100Ah
26	Press button switch cover	52	Battery clamp（with protective）

6.1.6 Hydraulic Diagram



6.1.7 Hydraulic Elements Table

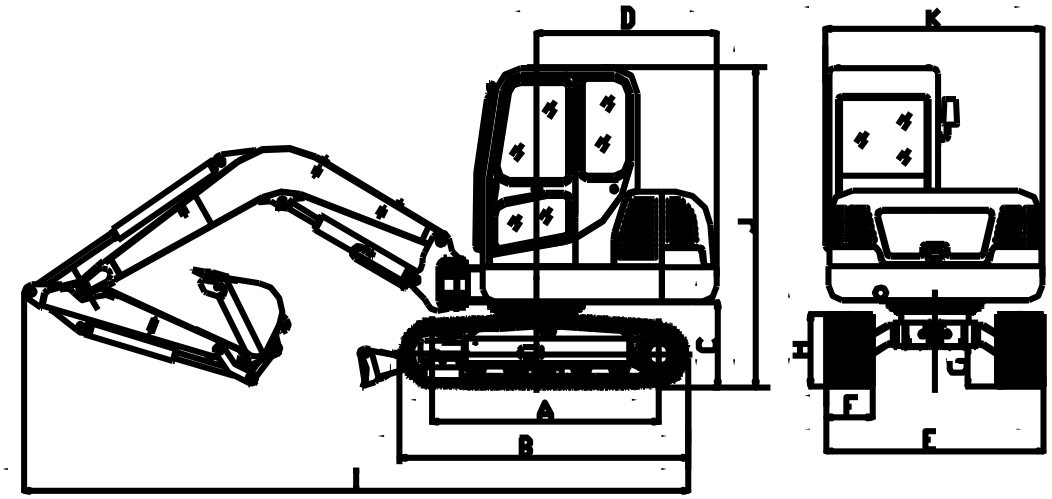
No.	Name	Qty
1	Main valve	1
2	Main pump	1
3	Swing motor	1
4	Right travel motor	1
5	Left travel motor	1
6	Central swing joint	1
7	Left pilot handle	1
8	Right pilot handle	1
9	Double couple foot valve	1
10	Pilot filter	1
11	Low pressure valve group	1
12	Boom cylinder	1
13	Arm cylinder	1
14	Bucket cylinder	1
15	Deflection cylinder	1

6.2 SWE60B TECHNICAL SPECIFICATION

6.2.1 Machine Specification

Machine specification		SWE60B
Operating weight	Equipped with rubber track	6110 kg
	Equipped with steel track	6180 kg
Standard bucket capacity		0.18 m3
Track shoe width		400 mm
Power plant		
Engine model		4TNV94L-BVSU
Type		Direct injection, water cooled, 4 strokes
Number of cylinders		4
Displacement		3.054 L
Rated power/revs		36.2 kW/2100 rpm
Fuel tank capacity		113 L
Hydraulic system		
Main pump		2 variable plunger pump,1 gear pump
Flow capacity		2×59+42 L/min
Work pressure setting		24/24/21 MPa
Front work attchment		24 Mpa
Travel		24 Mpa
Slewing		21 Mpa
Pilot pressure setting		3.9 Mpa
Hydraulic oil tank capacity		96 L
Performance specification		
Slewing speed		9.4 rpm
Travel speed		4.74/2.75 km/h
Max traction		42 kN
Max grade ability		35 °
Bucket max digging force		47 kN
Arm max digging force		31 kN
Boom deflection angle		R48 ℃L72 °

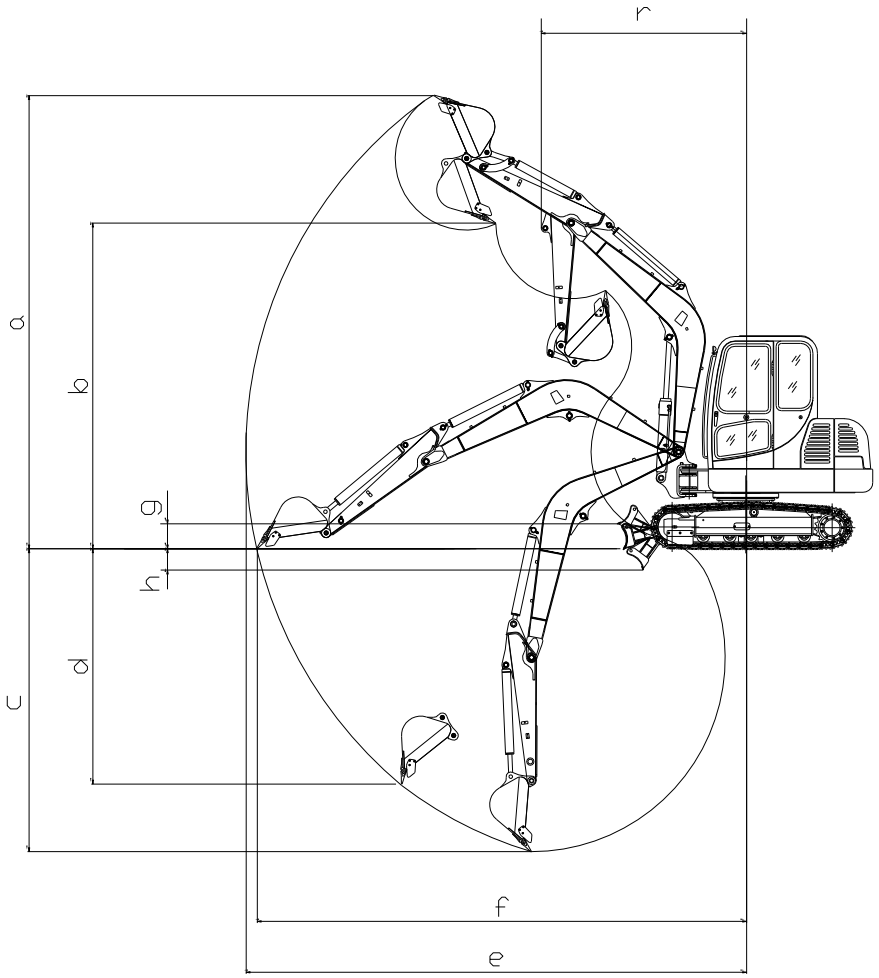
6.2.2 Boundary Dimension



Unit：mm

Machine Model		SWE60B
A	Wheel track	1965
B	Track total length	2495
C	Platform distance to ground	700
D	Platform slewing radius	1600
E	Chassis width	1880
F	Track width	400
G	Chassis distance to ground	320
H	Track height	595
I	Transportation length	5875
J	Cab roof height	2615
K	Upper structure width	1900

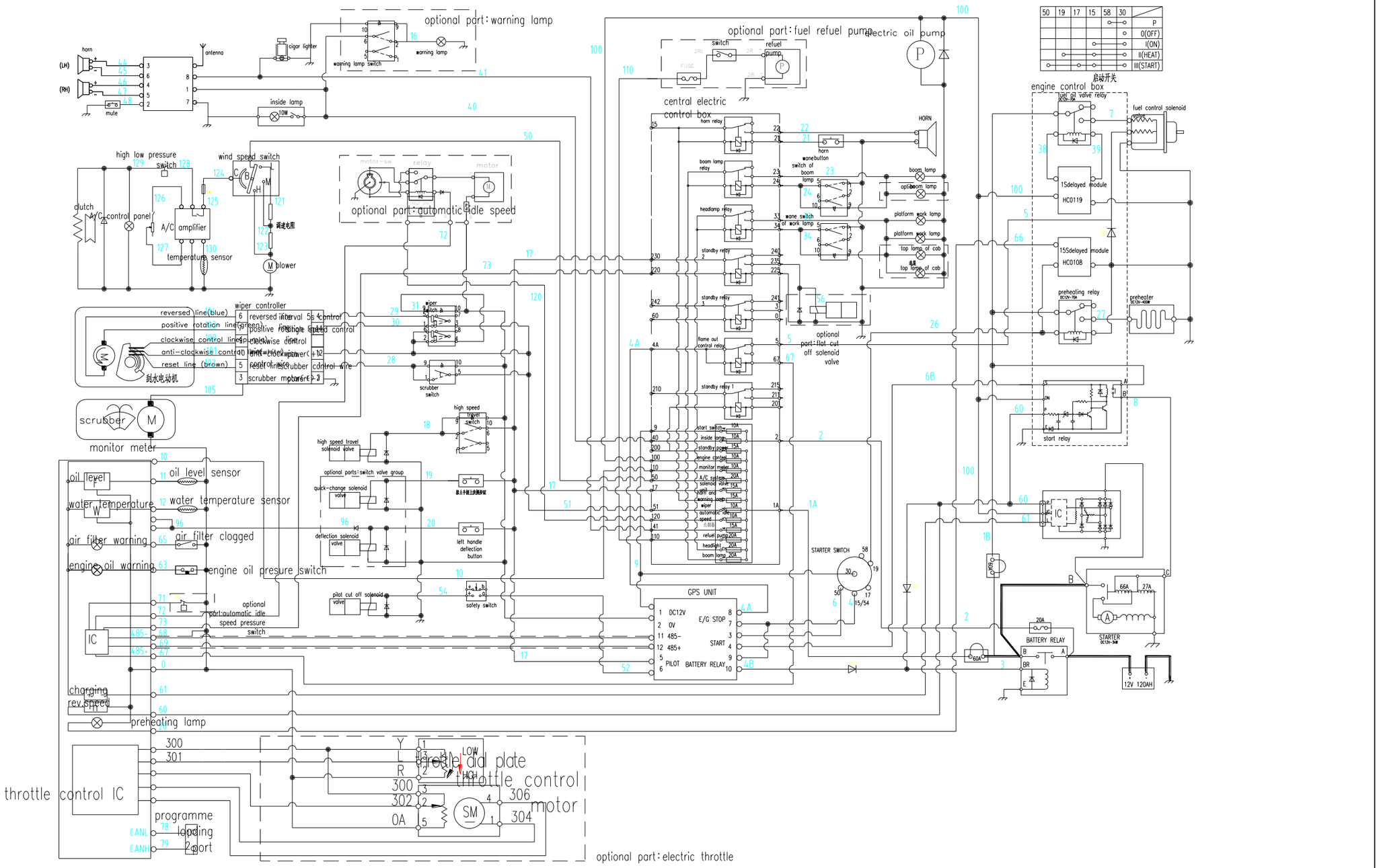
6.2.3 Work Specification



Unit：mm

Machine specification		SWE60B
a	Max digging height	5855
b	Max dumping height	4175
c	Max digging depth	3765
d	Max vertical digging depth	3290
e	Max digging radius	6175
f	Max reach at ground level	6040
g	Max.lifting heighet of dozer blade	445
h	Max.digging depth of dozer blade	340
r	Minimum swing radius	2480

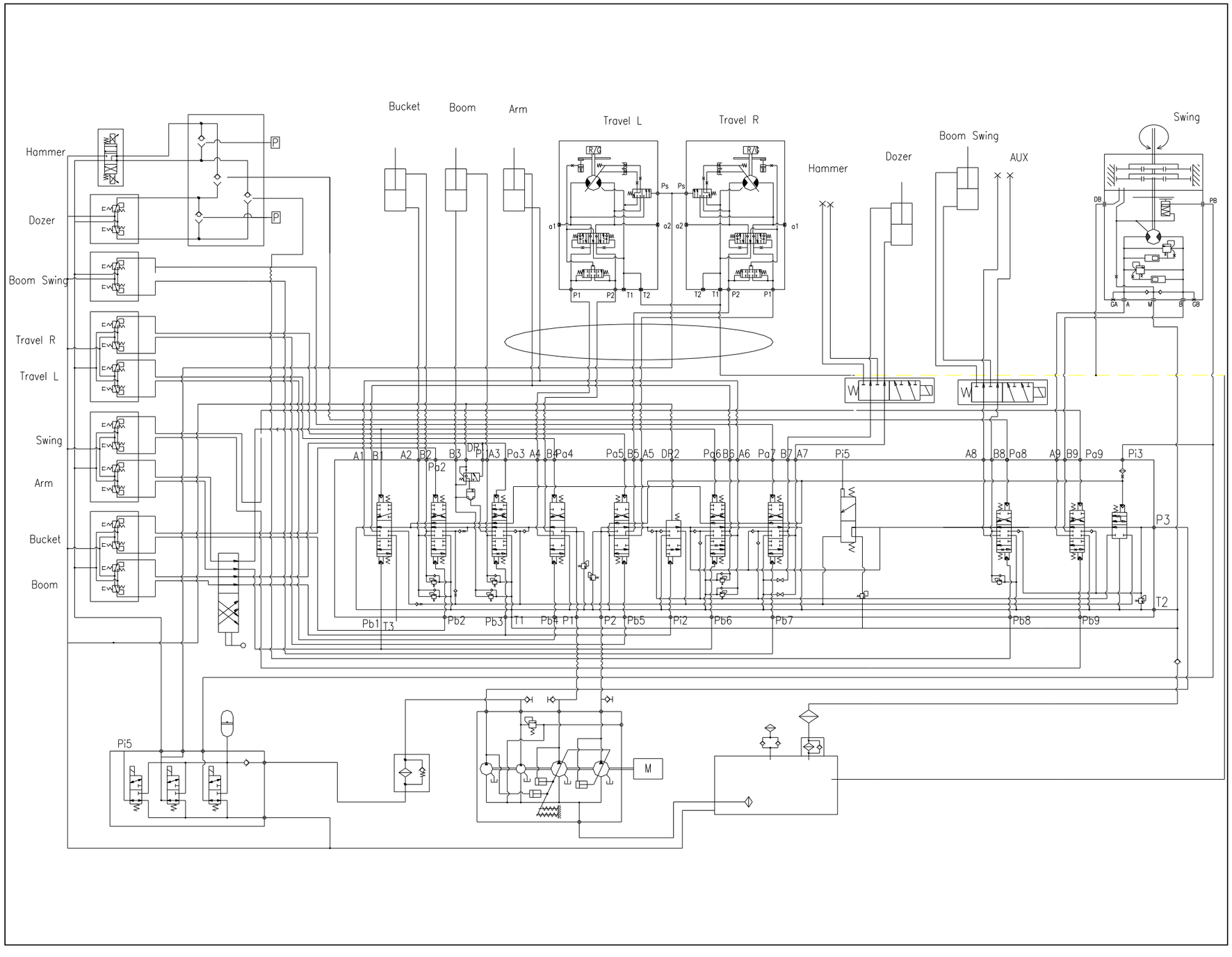
6.2.4 Circuit Diagram



6.2.5 Electrical Elements Table

NO.	NAME	NO.	NAME
1	Throttle servo-motor	27	Ignition lock
2	Safety relay	28	Monitor meter
3	Flameout control relay	29	Warm up relay
4	Fuel valve relay	30	Controller
5	Starter	31	Electric oil pump
6	Head light relay	32	Radio
7	Generator	33	Washer assy
8	Water temperature sensor	34	Wiper controller
9	Air filter indicator	35	Horn
10	Overheat warning switch	36	Lighter
11	Engine oil pressure warning switch	37	GPS
12	Solenoid power switch	38	Electric control case assy.
13	Throttle drive plate	39	Connector
14	Work light	40	Single core plug
15	Oil level sensor	41	1S Delayed module
16	Micro-active switch	42	15S Delayed module
17	Rocker switch end mounting frame	43	Standby relay 1
18	Rocker switch mid-frame	44	Standby relay 2
19	Auto-idle switch	45	Standby relay 3
20	Quick selection switch	46	Horn relay
21	Front light switch	47	Fuel gasoline pump
22	Work light switch	48	18 Core junctor
23	Alarm light switch	49	22 Core junctor
24	Wiper switch	50	Warning lamp
25	Washer switch	51	Accumulator100Ah
26	Rocker switch cover	52	Battery clamp（with protective）

6.2.6 Hydraulic Diagram



6.2.7 Hydraulic Elements Table

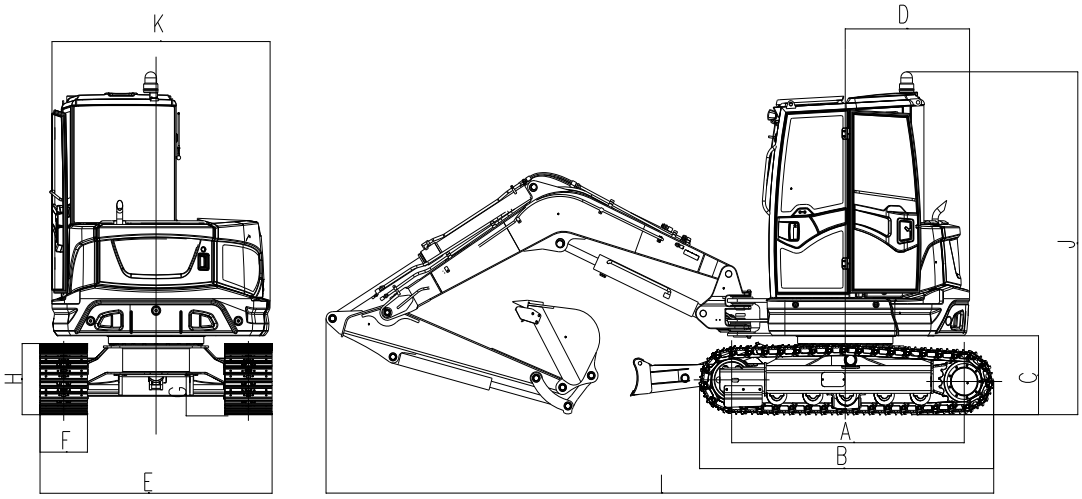
No.	Name	Qty
1	Main valve	1
2	Main pump	1
3	Swing motor	1
4	Right travel motor	1
5	Left travel motor	1
6	Central swing joint	1
7	Left pilot handle	1
8	Right pilot handle	1
9	Double couple foot valve	1
10	Pilot filter	1
11	Low pressure valve group	1
12	Boom cylinder	1
13	Arm cylinder	1
14	Bucket cylinder	1
15	Deflection cylinder	1

6.3 SWE60UF TECHNICAL SPECIFICATION

6.3.1 Machine Specification

Machine specification		SWE60UF
Operating weight	Equipped with rubber track	5630 kg
	Equipped with steel track	5700 kg
Standard bucket capacity		0.18 m3
Track shoe width		400 mm
Power plant		
Engine model		V2607-DI-TE4B
Type		Direct injection, water cooled, 4 strokes
Number of cylinders		4
Displacement		2.615 L
Rated power/revs		36.5 kw/2000 rpm
Fuel tank capacity		70 L
Hydraulic system		
Main pump		2 variable plunger pump,1 gear pump
Flow capacity		2×59+42 L/min
Work pressure setting		24.5 MPa
Front work equipment		24.5 Mpa
Travel		24 .5Mpa
Slewing		18.6 Mpa
pilot pressure setting		3.5Mpa
Hydraulic oil tank capacity		70 L
Performance specification		
Slewing speed		9.4 rpm
Travel speed		4.07/h/2.43 km/h
Max traction		48.9kN
Max grade ability		35 °
Bucket max digging force		46.8 kN
Arm max digging force		31.1 kN
Boom deflection angle		50 °(right)/70 °(left)

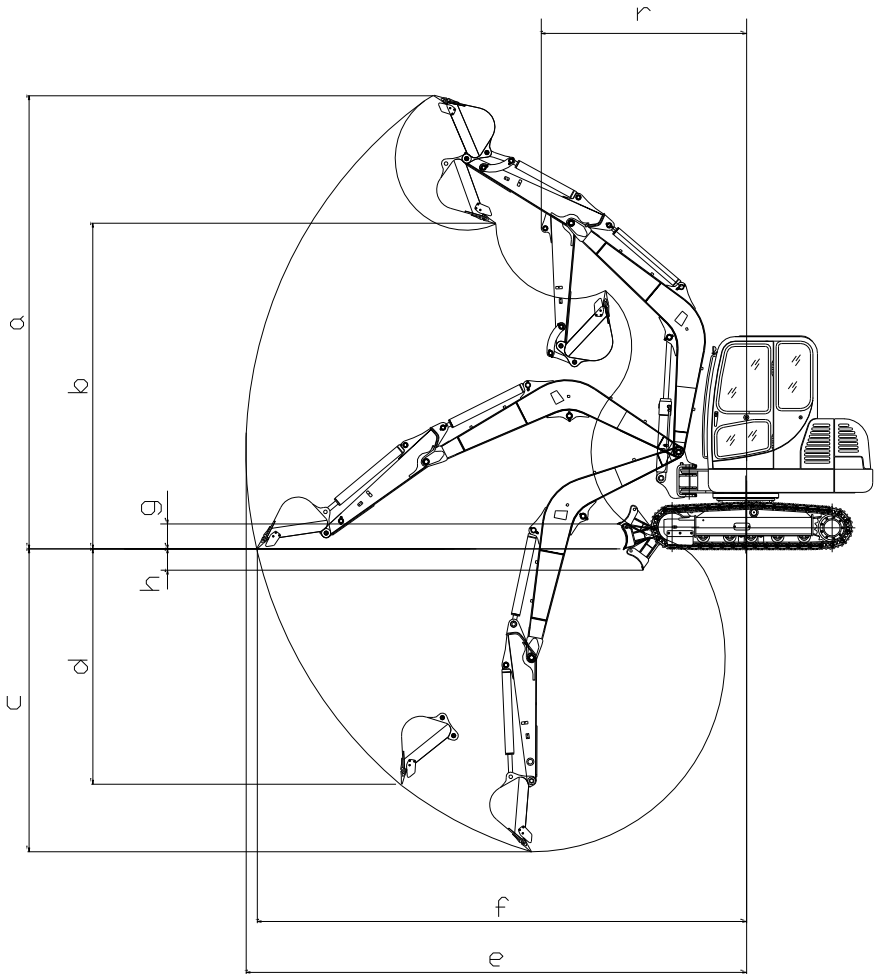
6.3.2 Boundary Dimension



Unit: mm

Machine Model		SWE60UF
A	Wheel track	1965
B	Track total length	2495
C	Platform ground clearance	630
D	Platform slewing radius	1050
E	Chassis width	1980
F	Track width	400
G	Chassis ground clearance	318
H	Track height	594
I	Total length	5498
J	Cab roof height	2550
K	Width of upper carriage	1830

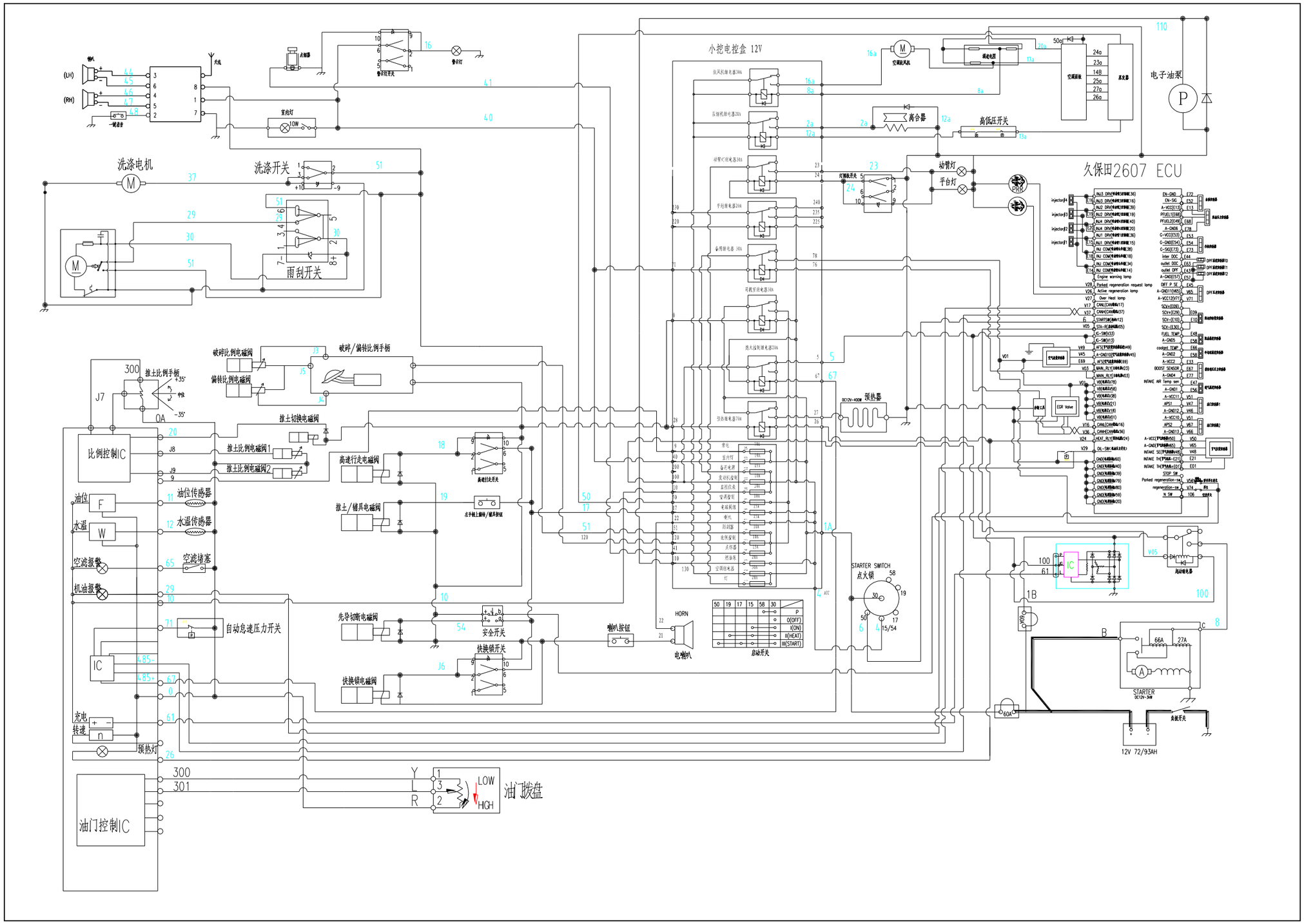
6.3.3 Work Specification



Unit: mm

Machine specification		SWE60UF
a	Max digging height	5670
b	Max dumping height	4013
c	Max digging depth	3671
d	Max vertical digging depth	3199
e	Max digging radius	6118
f	Max reach at ground level	5976
g	Max.lifting heighet of dozer blade	445
h	Max.digging depth of dozer blade	340
r	Minimum swing radius	2426

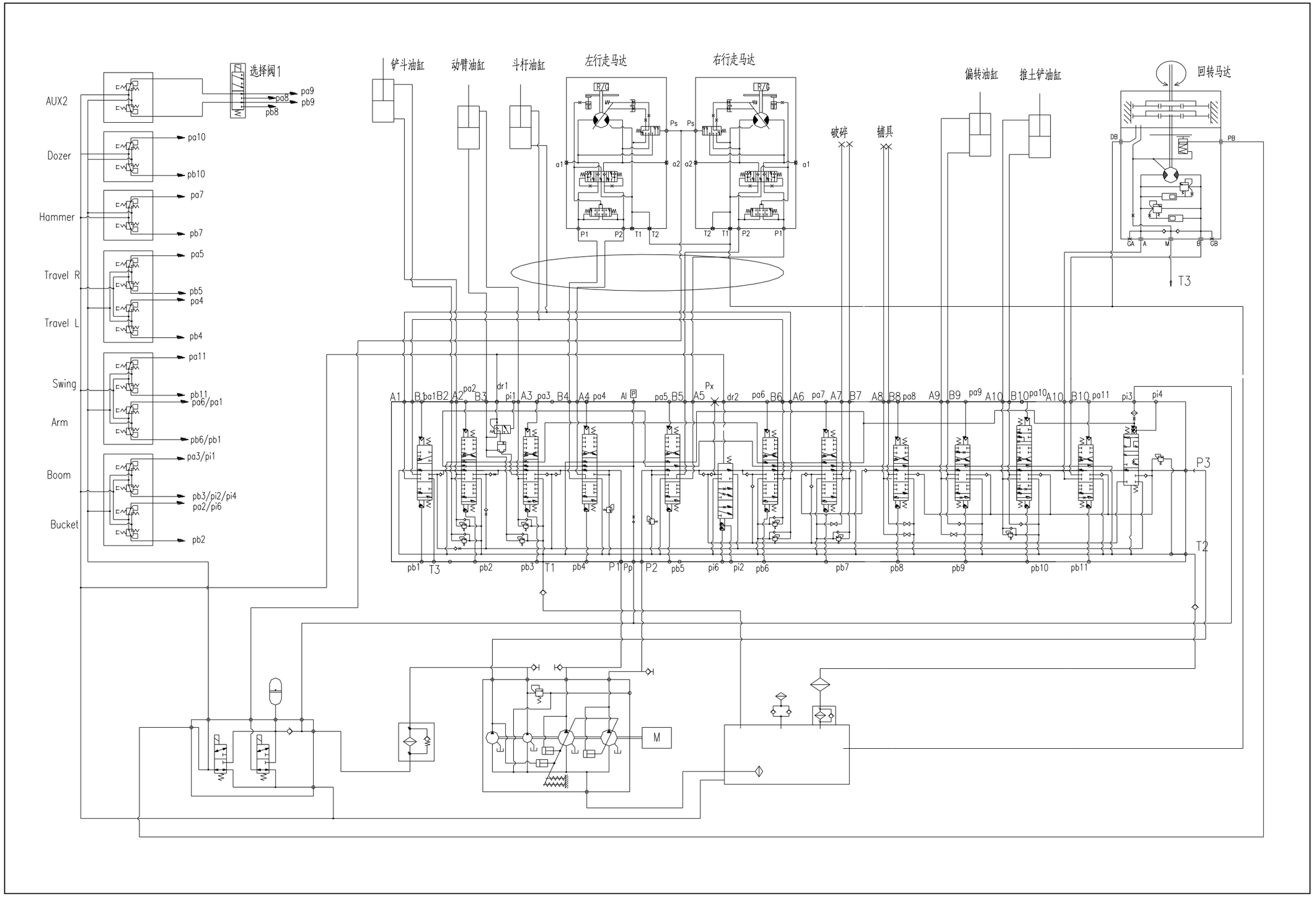
6.3.4 Circuit Diagram



6.3.5 Electrical Elements Table

NO.	NAME	NO.	NAME
1	gear performer relay	27	Press button switch cover
2	Main relay	28	Ignition lock
3	Boom lamp relay	29	Monitor meter
4	Platform work lamp relay	30	Warm up relay
5	Starter	31	Controller
6	Head light relay	32	Electric oil pump
7	generator	33	Radio
8	Water temperature sensor	34	Washer assy.
9	Air filter indicator	35	Wiper controller
10	Overheat warning switch	36	Horn
11	Engine oil pressure warning switch	37	Lighter
12	Solenoid power switch	38	GPS
13	Throttle drive plate	39	Electric control case assy.
14	Pressure switch	40	Start control relay
15	Work light	41	Connector
16	Oil level sensor	42	Single core plug
17	Micro-active switch	43	1S Delayed module
18	Rocker switch end mounting frame	44	15S Delayed module
19	Rocker switch mid-frame	45	Horn relay
20	Auto-idle switch	46	Fuel gasoline pump
21	Quick selection switch	47	18 Core junctor
22	Front light switch	48	22 Core junctor
23	Work light switch	49	Warning lamp
24	Alarm light switch	50	Accumulator100Ah
25	Wiper switch	51	Battery clamp（with protective）
26	Washer switch	52	Engine controller

6.3.6 Hydraulic Diagram



6.3.7 Hydraulic Elements Table

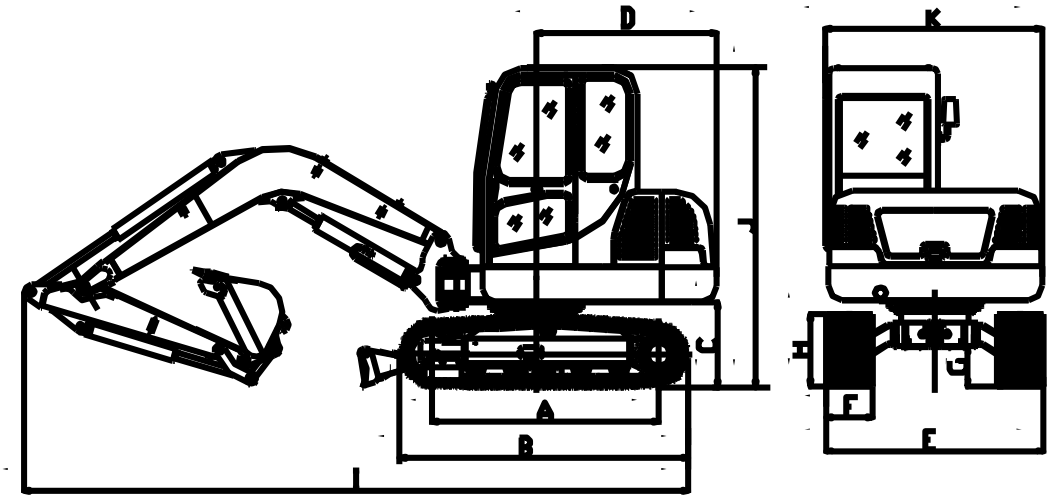
No.	Name	Qty
1	Main valve	1
2	Main pump	1
3	Swing motor	1
4	Right travel motor	1
5	Left travel motor	1
6	Central swing joint	1
7	Left pilot handle	1
8	Right pilot handle	1
9	Double couple foot valve	1
10	Pilot filter	1
11	Low pressure valve group	1
12	Boom cylinder	1
13	Arm cylinder	1
14	Bucket cylinder	1
15	Deflection cylinder	1

6.4 SWE70B Technical Specification

6.4.1 Machine Specification

Machine specification		SWE70B
Operating weight	Equipped with rubber track	6570 kg
	Equipped with steel track	6630 kg
Standard bucket capacity		0.22 m3
Track shoe width		400 mm
Power plant		
Engine model		4TNV98-ZSSU
Type		Direct injection, water cooled, 4 strokes
Number of cylinders		4
Displacement		3.319 L
Rated power/revs		43.4 kW/2200 rpm
Fuel tank capacity		118 L
Hydraulic system		
Main pump		2 variable plunger pump,1 gear pump
Flow capacity		2×59+42 L/min
Work pressure setting		24/24/21 MPa
Front work equipment		24 Mpa
Travel		24 Mpa
Slewing		21 Mpa
pilot pressure setting		3.9 Mpa
Hydraulic oil tank capacity		96 L
Performance specification		
Slewing speed		9 rpm
Travel speed		4.0/2.3 km/h
Max traction		56.7 kN
Max grade ability		35 °
Bucket max digging force		49.4 kN
Arm max digging force		31 kN
Boom deflection angle		R73 ℃L60 °

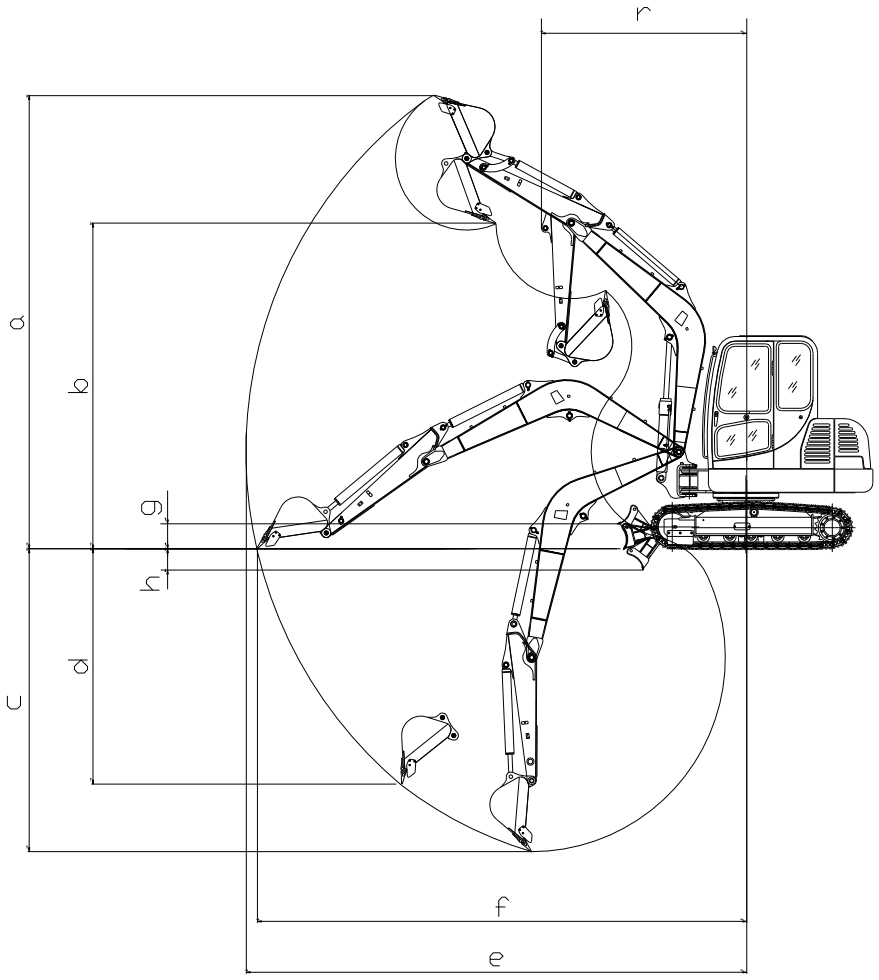
6.4.2 Boundary Dimension



Unit：mm

Machine Model		SWE70B
A	Wheel track	2240
B	Track total length	2760
C	Platform ground clearance	700
D	Platform slewing radius	1650
E	Chassis width	2080
F	Track width	400
G	Chassis ground clearance	340
H	Track height	580
I	Total length	6100
J	Cab roof height	2625
K	Upper carriage width	2080

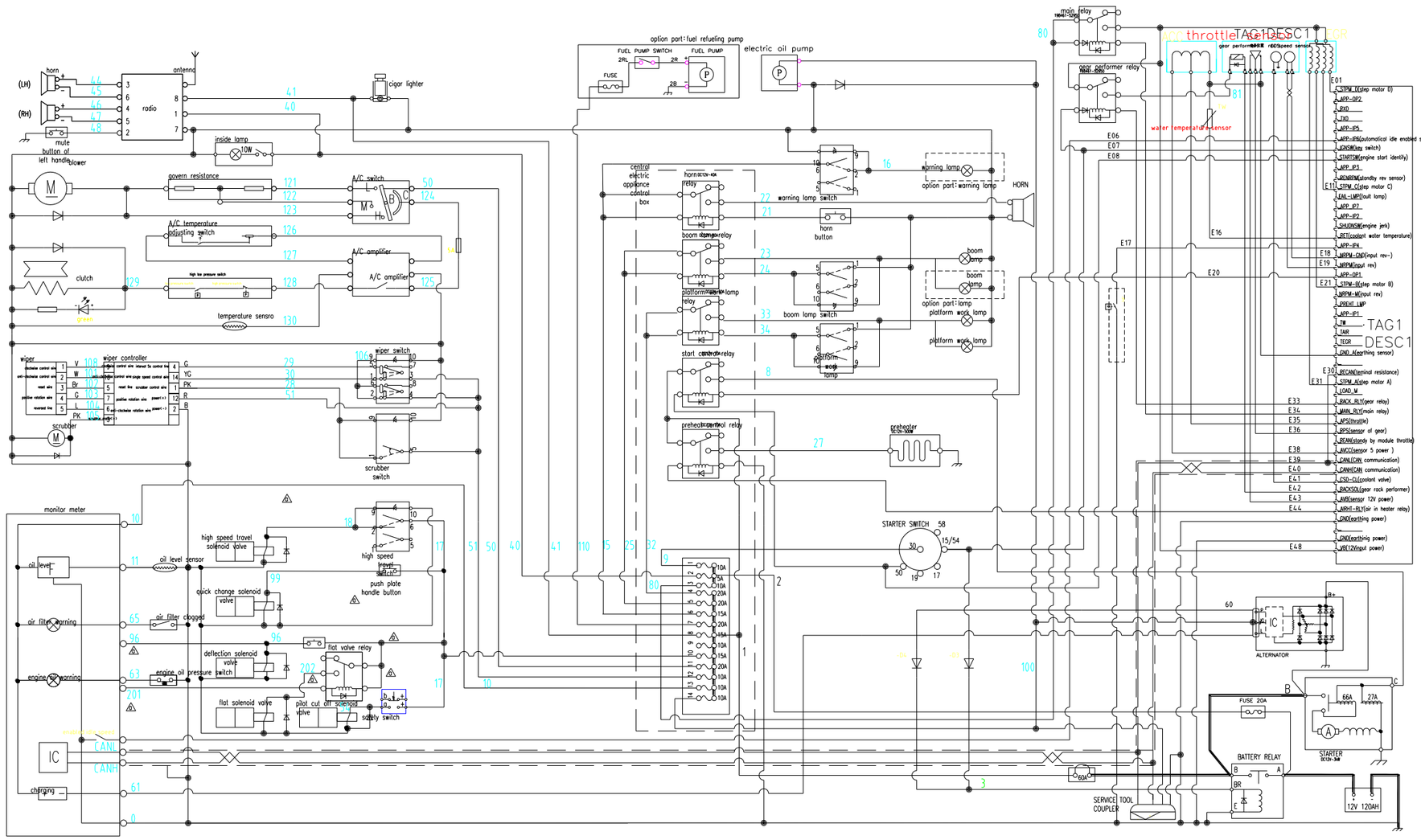
6.4.3 Work Parameters



Unit：mm

Machine specification		SWE70B
a	Max. digging height	5970
b	Max. dumping height	4160
c	Max. digging depth	4065
d	Max. vertical digging depth	2890
e	Max. digging radius	6335
f	Max. reach at ground level	6210
g	Max.lifting height of push plate	475
h	Max.digging depth of push plate	290
r	Minimum swing radius	2415

6.4.4 Circuit Diagram



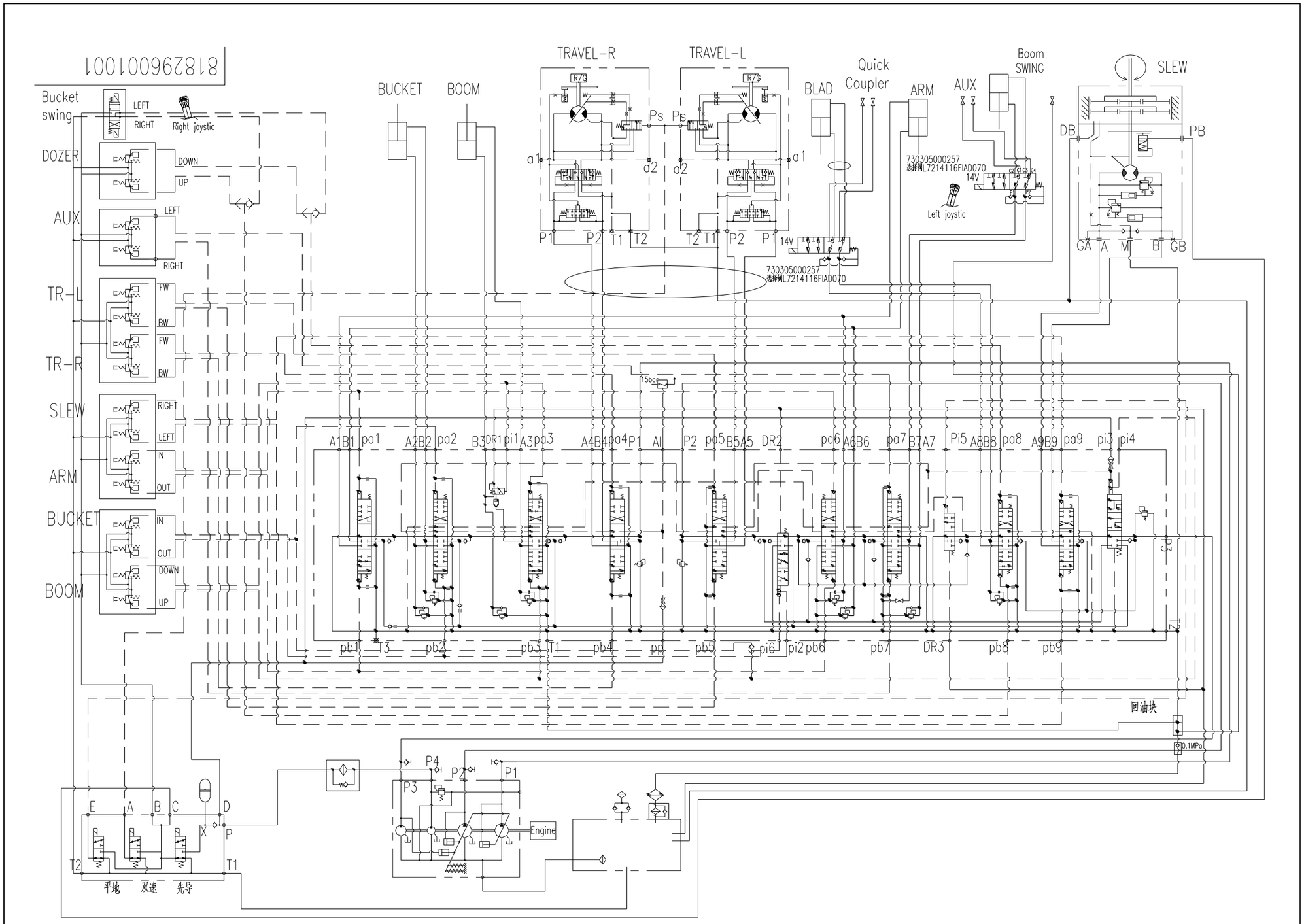
STARTER SWITCH CONNECTION

	30	58	15	17	19	50
P	o	o				
0(OFF)	o					
I(ON)	o		o			
II(HEAT)	o		o		o	
III(START)	o		o	o		o

6.4.5 Electrical Elements table

NO.	NAME	NO.	NAME
1	Gear performer relay	27	Press button switch cover
2	Main relay	28	Ignition lock
3	Boom lamp relay	29	Monitor meter
4	Platform work lamp relay	30	Warm up relay
5	Starter	31	Controller
6	Head light relay	32	Electric oil pump
7	generator	33	Radio
8	Water temperature sensor	34	Washer assy.
9	Air filter indicator	35	Wiper controller
10	Overheat warning switch	36	Horn
11	Engine oil pressure warning switch	37	Lighter
12	Solenoid power switch	38	GPS
13	Throttle drive plate	39	Electric control case assy.
14	Pressure switch	40	Starting control relay
15	Work light	41	Connector
16	Oil level sensor	42	Single core plug
17	Micro-active switch	43	1S Delayed module
18	Press button switch end mounting frame	44	15S Delayed module
19	Press button switch mid-frame	45	Horn relay
20	Auto-idle switch	46	Fuel gasoline pump
21	Quick selection switch	47	18 Core junctor
22	Front light switch	48	22 Core junctor
23	Work light switch	49	Warning lamp
24	Alarm light switch	50	Accumulator100Ah
25	Wiper switch	51	Battery clamp（with protective）
26	Washer switch	52	Engine controller

6.4.6 Hydraulic Diagram



6.4.7 Hydraulic Elements Table

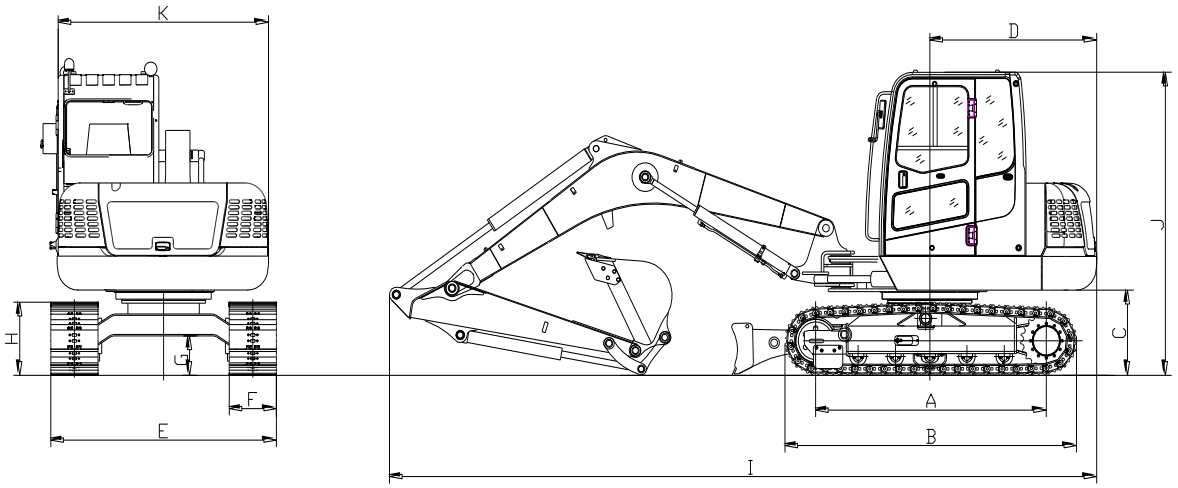
No.	Name	Qty
1	Main valve	1
2	Main pump	1
3	Swing motor	1
4	Right travel motor	1
5	Left travel motor	1
6	Central swing joint	1
7	Left pilot handle	1
8	Right pilot handle	1
9	Double couple foot valve	1
10	Pilot filter	1
11	Low pressure valve group	1
12	Boom cylinder	1
13	Arm cylinder	1
14	Bucket cylinder	1
15	Deflection cylinder	1

6.5 SWE80B TECHNICAL SPECIFICATION

6.5.1 Machine Specification

Machine Model		SWE80B
Operating weight	Equipped with rubber track	7810 kg
	Equipped with steel track	7860 kg
Standard bucket capacity		0.28 m3
Track shoe width		450 mm
Power plant		
Engine model		4TNV98-ZSSU
Type		Direct injection, water cooled, 4 strokes
Number of cylinders		4
Displacement		3.319 L
Rated power/revs		43.4 kW/2200 rpm
Fuel tank capacity		118 L
Hydraulic system		
Main pump		1 variable plunger pump
Flow		156 L/min
Work pressure		26 MPa
Front work attachment(reinforcement)		26 Mpa
Travel		26 Mpa
Slewing		26 Mpa
pilot pressure		3.9 Mpa
Hydraulic oil tank capacity		96 L
Performance specification		
Slewing speed		10 rpm
Travel speed		4.0/2.4 km/h
Max traction		62 kN
Max grade ability		35 °
Bucket max digging force		53.1 kN
Arm max digging force		36.3 kN
Boom deflection angle		R73 °/L60 °

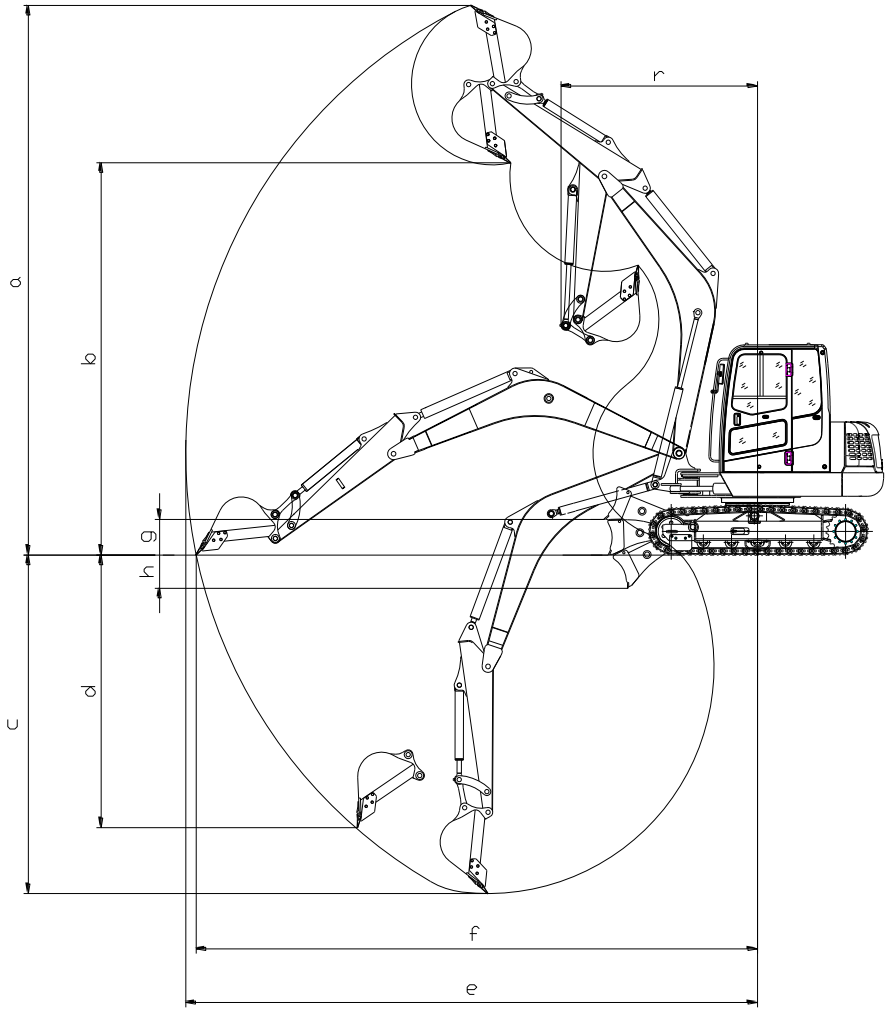
6.5.2 Boundary Dimension



Unit：mm

Machine Model		SWE80B
A	Wheel track	2200
B	Track total length	2785
C	Platform ground clearance	745
D	Platform slewing radius	1680
E	Chassis width	2150
F	Track width	450
G	Chassis ground clearance	340
H	Track height	640
I	Total length	6805
J	Cab roof height	2665
K	Upper carriage width	2160

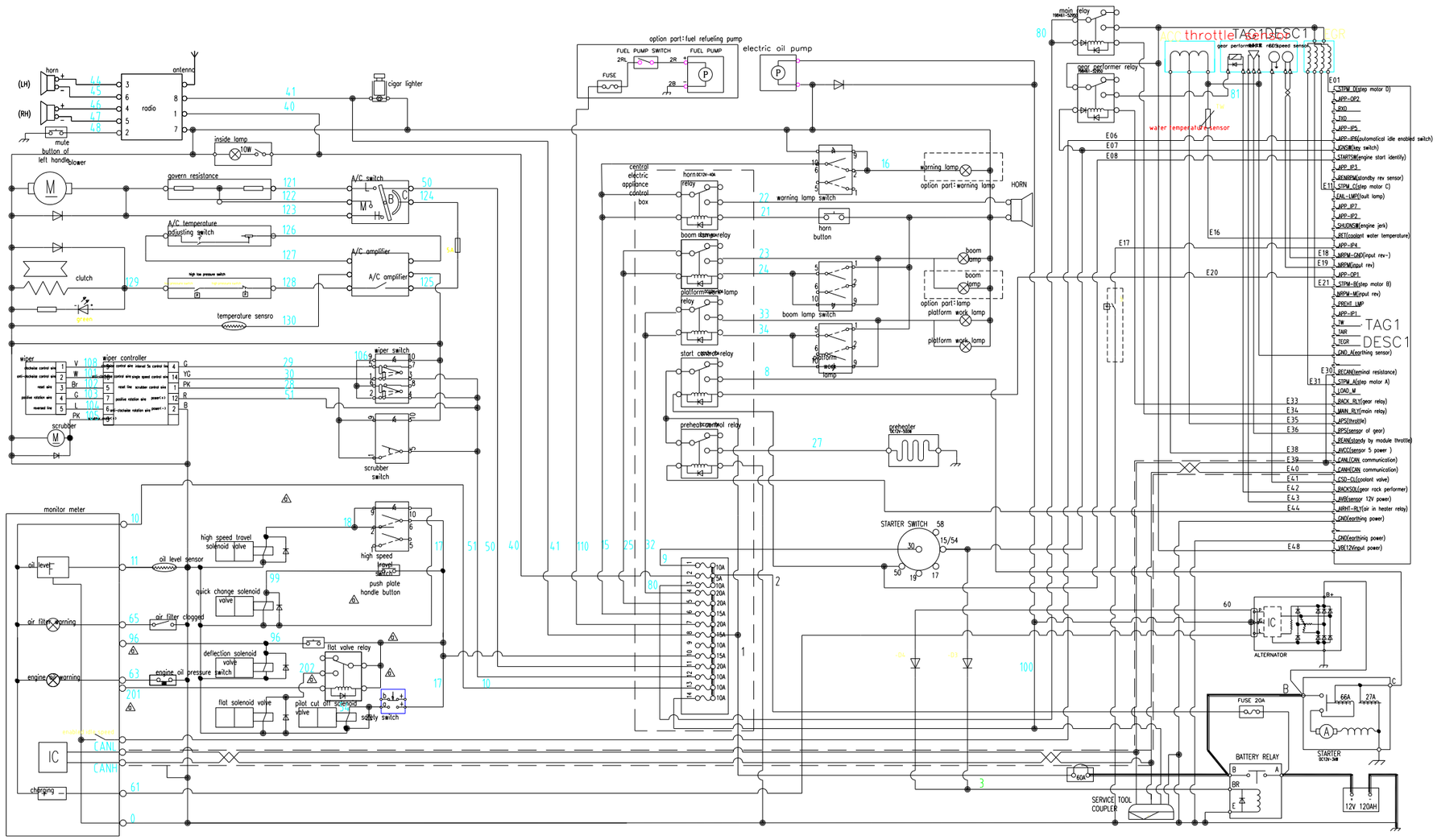
6.5.3 Work Parameters



Unit：mm

Machine Model		SWE80B
a	Max digging height	6820
b	Max dumping height	4870
c	Max digging depth	4195
d	Max vertical digging depth	3365
e	Max digging radius	7175
f	Max reach at ground level	7030
g	Max.lifting height of dozer blade	420
h	Max.digging depth of dozer blade	480
r	Minimum swing radius	2620

6.5.4 Circuit Diagram



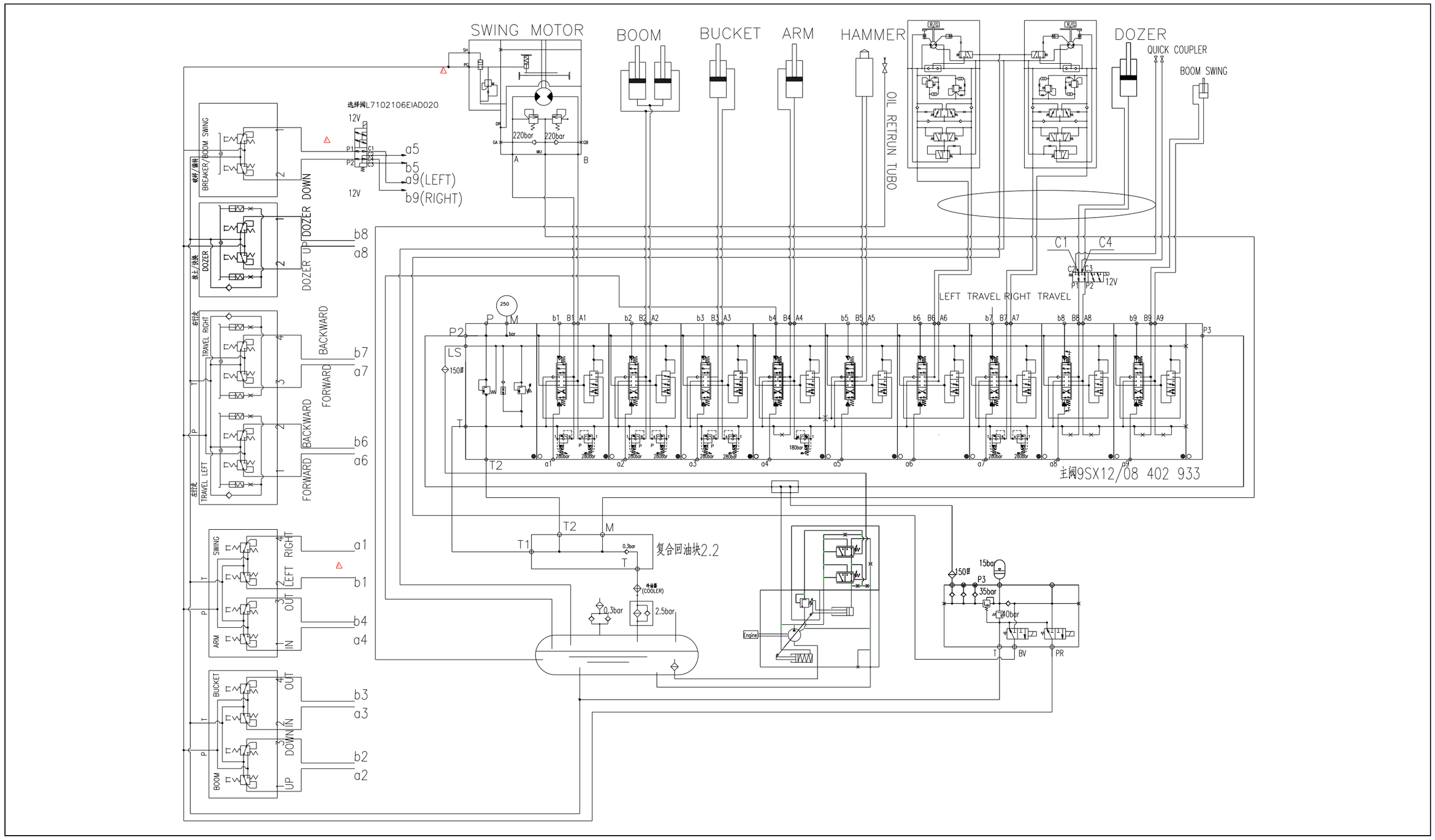
STARTER SWITCH CONNECTION

	30	58	15	17	19	50
P	o	o				
O(OFF)	o					
I(ON)	o		o			
II(HEAT)	o		o		o	
III(START)	o		o	o		o

6.5.5 Electrical Elements Table

N.O	NAME	N.O	NAME
1	Gear performer relay	27	Rocker switch cover
2	Main relay	28	Ignition lock
3	Boom lamp relay	29	Monitor meter
4	Platform work lamp relay	30	Warm up relay
5	Starter	31	Controller
6	Head light relay	32	Electric oil pump
7	generator	33	Radio
8	Water temperature sensor	34	Washer assy.
9	Air filter indicator	35	Wiper controller
10	Overheat warning switch	36	Horn
11	Engine oil pressure warning switch	37	Lighter
12	Solenoid power switch	38	GPS
13	Throttle drive plate	39	Electric control case assy.
14	Pressure switch	40	Start control controller
15	Work light	41	Connector
16	Oil level sensor	42	Single core plug
17	Micro-active switch	43	1S Delayed module
18	Rocker switch end mounting frame	44	15S Delayed module
19	Rocker switch mid-frame	45	Horn relay
20	Auto-idle switch	46	Fuel gasoline pump
21	Quick selection switch	47	18 Core junctor
22	Front light switch	48	22 Core junctor
23	Work light switch	49	Warning lamp
24	Alarm light switch	50	Accumulator100Ah
25	Wiper switch	51	Battery clamp（with protective）
26	Washer switch	52	Engine controller

6.5.6 Hydraulic Diagram



6.5.7 Hydraulic component table

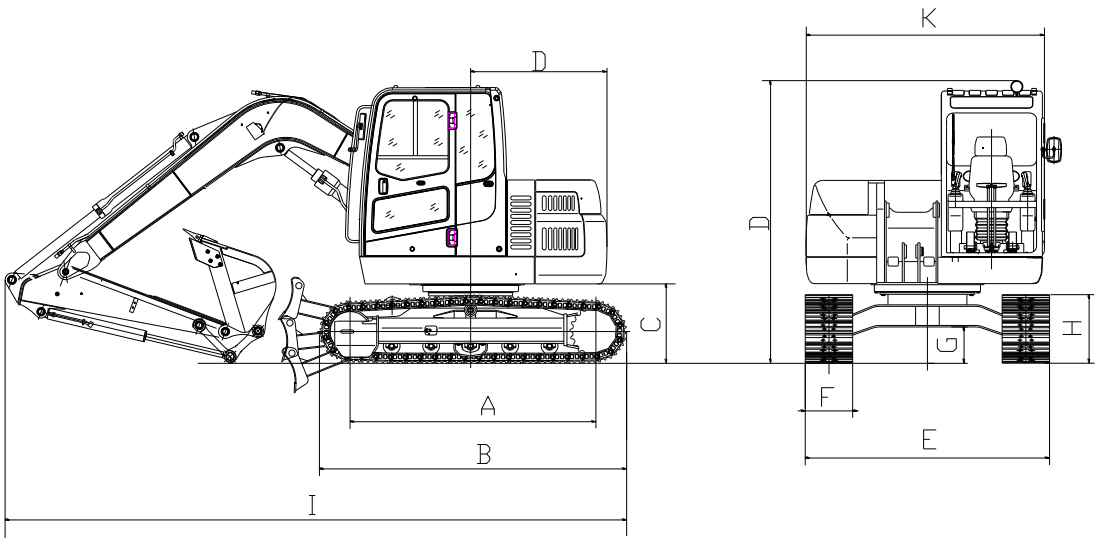
No.	Name	Qty
1	Main valve	1
2	Main pump	1
3	Swing motor	1
4	Right travel motor	1
5	Left travel motor	1
6	Central swing joint	1
7	Left pilot handle	1
8	Right pilot handle	1
9	Double couple foot valve	1
10	Pilot filter	1
11	Low pressure valve group	1
12	Boom cylinder	2
13	Arm cylinder	1
14	Bucket cylinder	1
15	Deflection cylinder	1

6.6 SWE90UB MACHINE SPECIFICATION

6.6.1 Machine Specification

Machine model		SWE90UB
Operating weight	Equipped with rubber track	8160 kg
	Equipped with steel track	8340 kg
Standard bucket capacity		0.3 m3
Track shoe width		450 mm
Power plant		
Engine model		4TNV98-ZSSU
Type		Direct injection, water cooled, 4 strokes
Number of cylinders		4
Displacement		3.319 L
Rated power/revs		43.4 kW/2200 rpm
Fuel tank capacity		125 L
Hydraulic system		
Main pump		1 Variable plunger pump
Flow capacity		160 L/min
Work pressure setting		28 MPa
Front work attachment (reinforcement)FF		28 Mpa
Travel		28 Mpa
Slewing		28 Mpa
pilot pressure setting		3.9 Mpa
Hydraulic oil tank capacity		80 L
Performance specification		
Slewing speed		11.2 rpm
Travel speed		4.5/2.7 km/h
Max traction		66.8 kN
Max grade ability		35 °
Bucket max digging force		55 kN
Arm max digging force		38 kN

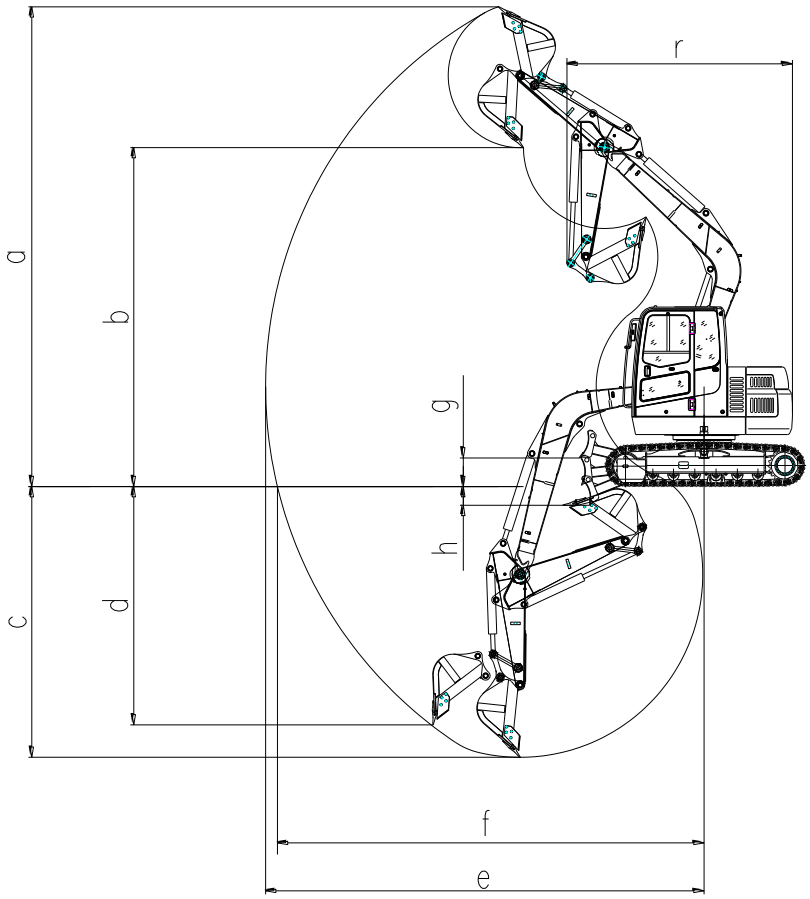
6.6.2 Boundary Dimension



Unut ： mm

Machine Model		SWE90UB
A	Wheel track	2335
B	Track total length	2920
C	Platform ground clearance	760
D	Platform slewing radius	1295
E	Chassis width	2320
F	Track width	450
G	Chassis ground clearance	345
H	Track height	660
I	Total length	5920
J	Cab roof height	2685
K	Upper carriage width	2425

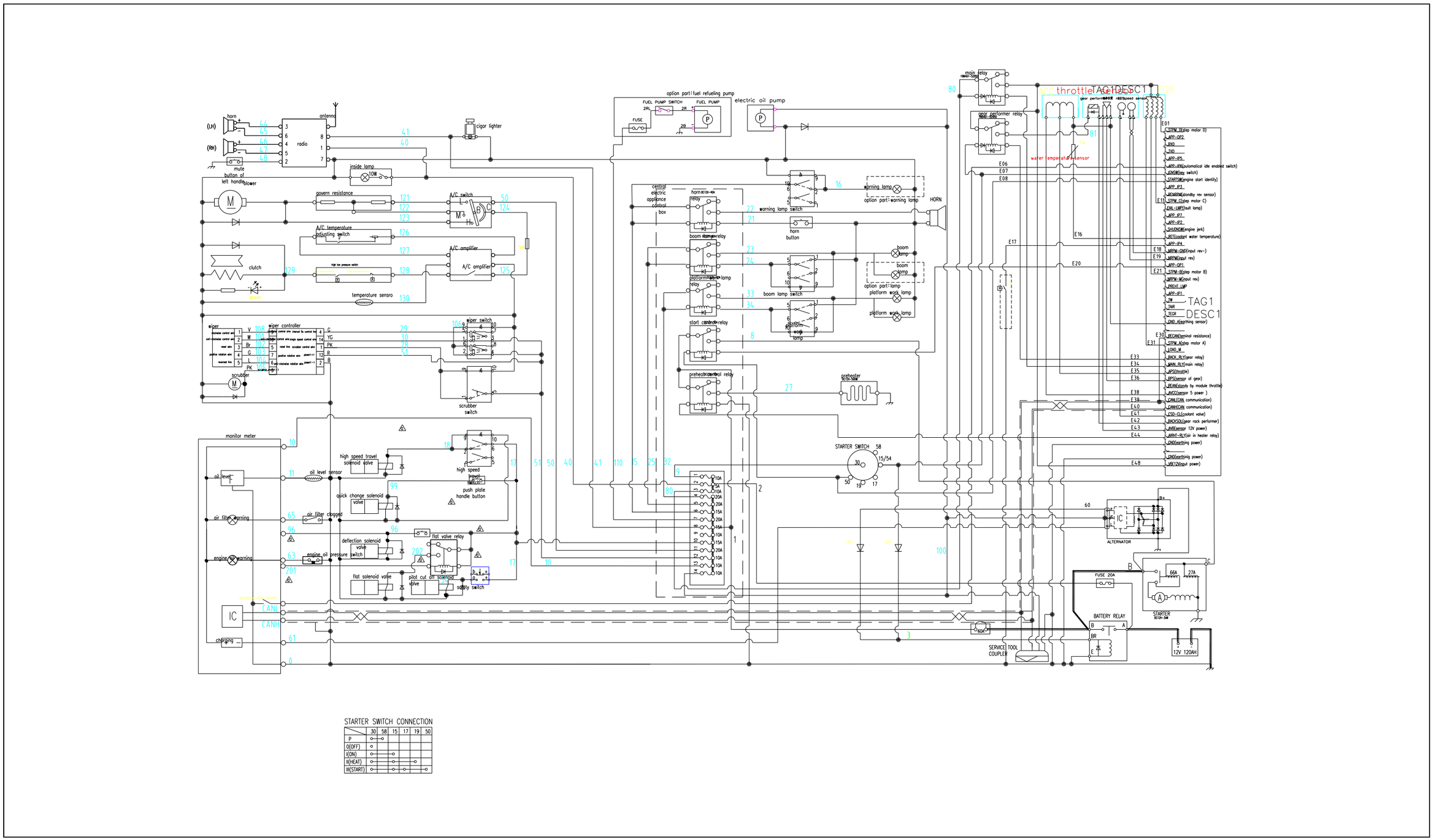
6.6.3 Work Parameters



Unit：mm

Machine Model		SWE90UB
a	Max digging height	7005
b	Max dumping height	4950
c	Max digging depth	3950
d	Max vertical digging depth	3480
e	Max digging radius	6420
f	Max reach at ground level	6250
g	Max.lifting height of push plate	410
h	Max.digging depth of push plate	280
r	Minimum swing radius	2050

6.6.4 Circuit Diagram



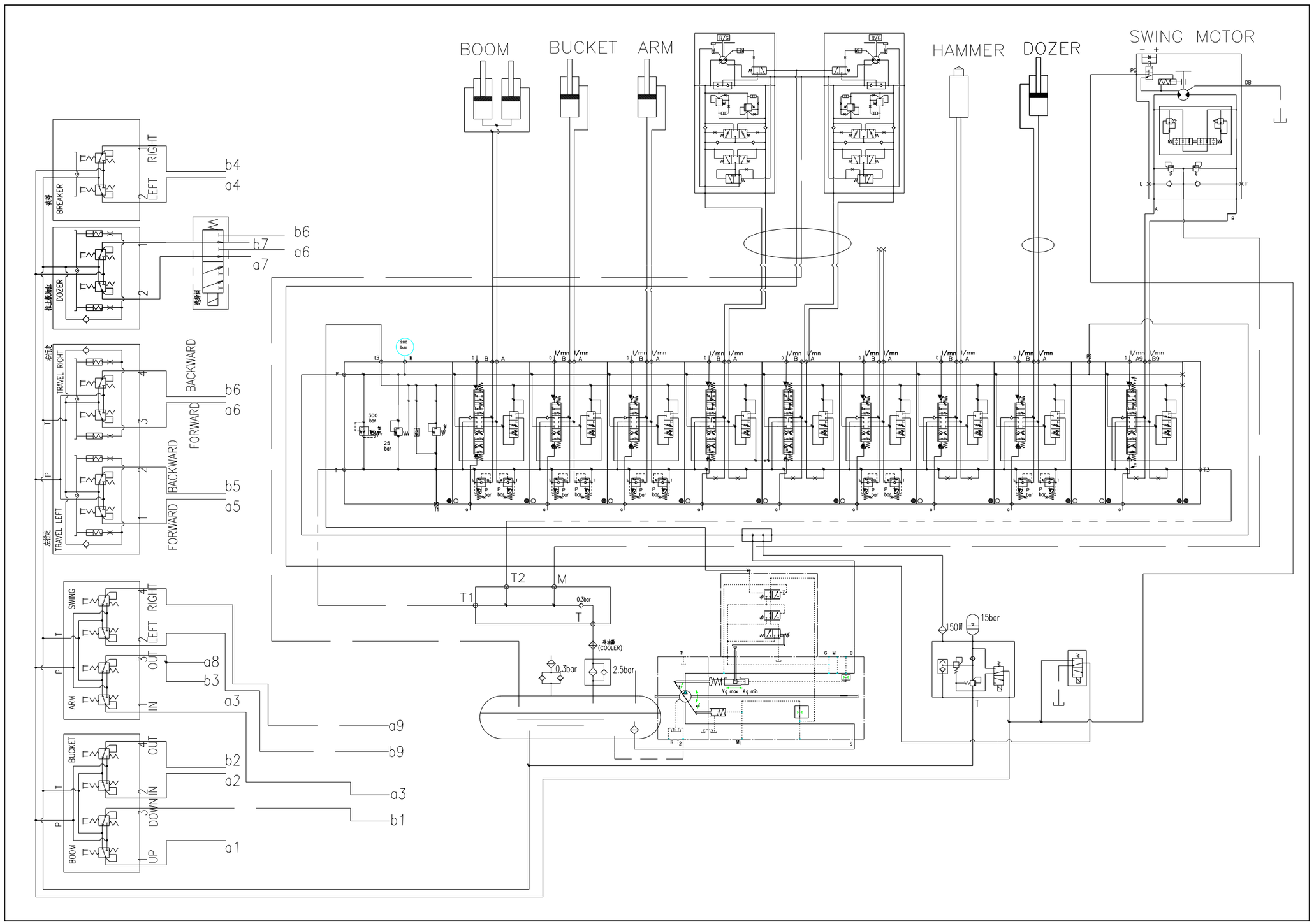
STARTER SWITCH CONNECTION

	30	58	15	17	19	50
P	o	o				
O(OFF)	o					
I(ON)	o		o			
II(HEAT)	o		o		o	
III(START)	o		o	o		o

6.6.5 Electrical Elements Table

N.O	NAME	N.O	NAME
1	Gear performer relay	27	Rocker switch cover
2	Main relay	28	Ignition lock
3	Boom lamp relay	29	Monitor meter
4	Platform work lamp relay	30	Warm up relay
5	Starter	31	Controller
6	Head light relay	32	Electric oil pump
7	Generator	33	Radio
8	Water temperature sensor	34	Washer assy.
9	Air filter indicator	35	Wiper controller
10	Overheat warning switch	36	Horn
11	Engine oil pressure warning switch	37	Lighter
12	Solenoid power switch	38	GPS
13	Throttle drive plate	39	Electric control case assy.
14	Pressure switch	40	Start control controller
15	Work light	41	Connector
16	Oil level sensor	42	Single core plug
17	Micro-active switch	43	1S Delayed module
18	Press button switch end mounting frame	44	15S Delayed module
19	Press button switch mid-frame	45	Horn relay
20	Auto-idle switch	46	Fuel gasoline pump
21	Quick selection switch	47	18 Core junctor
22	Front light switch	48	22 Core junctor
23	Work light switch	49	Warning lamp
24	Alarm light switch	50	Accumulator100Ah
25	Wiper switch	51	Battery clamp（with protective）
26	Washer switch	52	Engine controller

6.6.6 Hydraulic Diagram



6.6.7 Hydraulic Elements Table

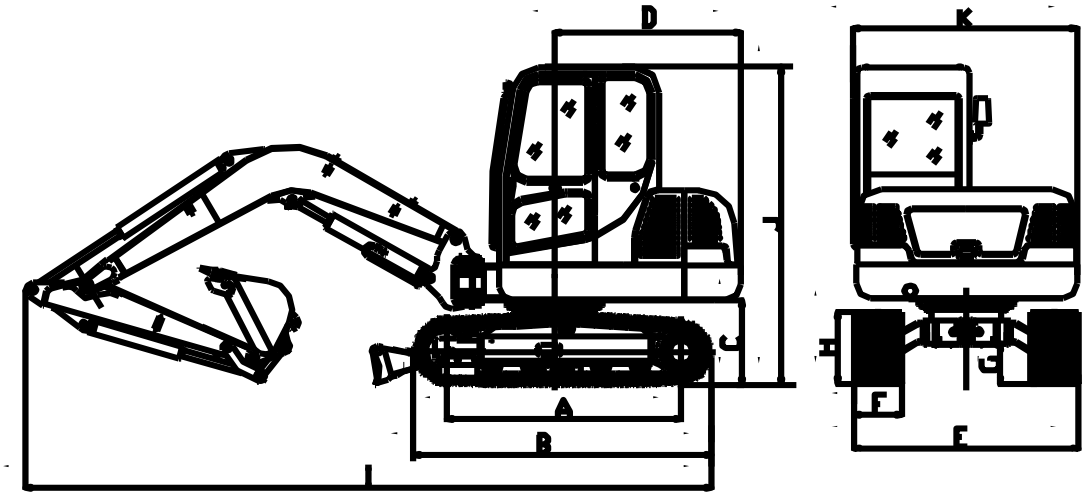
No.	Name	Qty
1	Main valve	1
2	Main pump	1
3	Swing motor	1
4	Right travel motor	1
5	Left travel motor	1
6	Central swing joint	1
7	Left pilot handle	1
8	Right pilot handle	1
9	Double couple foot valve	1
10	Pilot filter	1
11	Low pressure valve group	1
12	Boom cylinder	2
13	Arm cylinder	1
14	Bucket cylinder	1
15	Deflection cylinder	1

6.7 SWE70F TECHNICAL SPECIFICATION

6.7.1 Machine Specification

Machine model		SWE70F
Operating weight	Equipped with rubber track	6570 kg
	Equipped with steel track	6630 kg
Standard bucket capacity		0.22 m3
Track shoe width		400 mm
Power plant		
Engine model		4TNV98C-SSU
Type		Direct injection, water cooled, 4 strokes
Cylinder number		4
Displacement		3.319 L
Rated power/revs		46.2 kW/2200 rpm
Fuel tank capacity		118 L
Hydraulic system		
Main pump		2 variable plunger pump ,1 gear pump
Flow		2×59+42 L/min
Work pressure		24/24/21 MPa
Front work attachment(reinforcement)		24 Mpa
Travel		24 Mpa
Slewing		21 Mpa
pilot pressure		3.9 Mpa
Hydraulic oil tank capacity		96 L
Performance specification		
Slewing speed		9 rpm
Travel speed		4.0/2.3 km/h
Max traction		56.7 kN
Max grade ability		35 °
Bucket max digging force		50 kN
Arm max digging force		31 kN
Boom deflection angle		R73 ℃L60 °

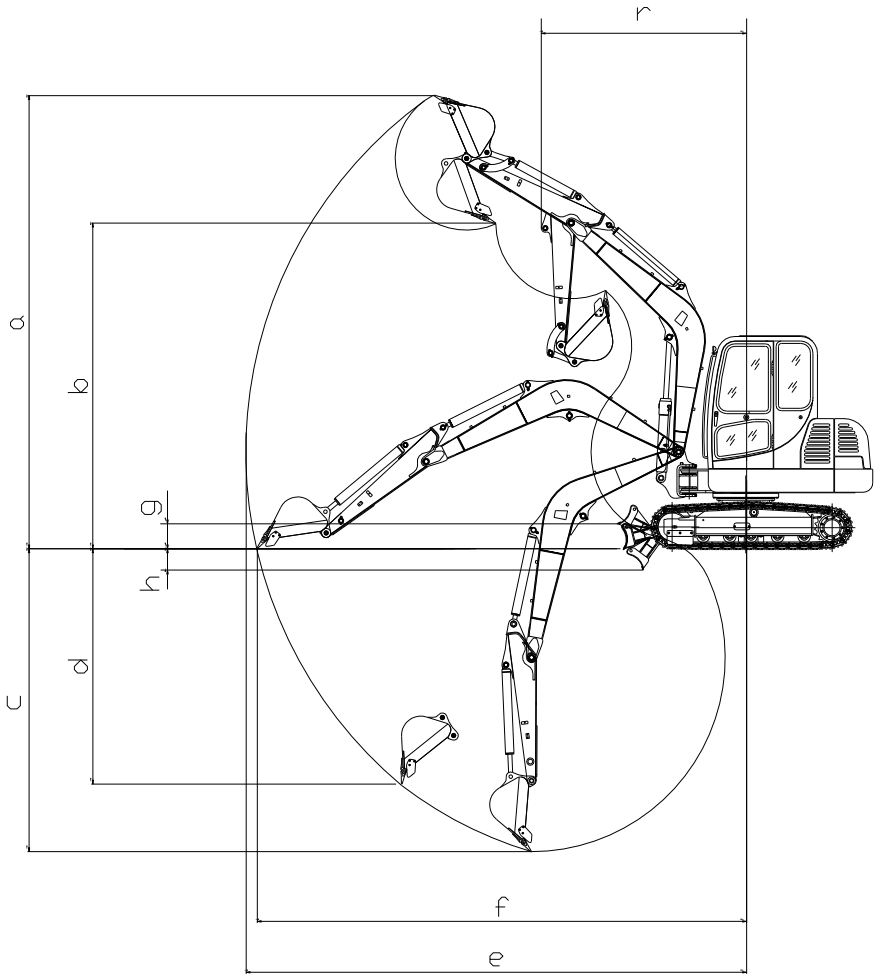
6.7.2 Boundary Dimension



Unit：mm

Machine Model		SWE70F
A	Wheel track	2240
B	Track total length	2760
C	Platform ground clearance	700
D	Platform slewing radius	1650
E	Chassis width	2080
F	Track width	400
G	Chassis ground clearance	340
H	Track height	580
I	Total length	6100
J	Cab roof height	2625

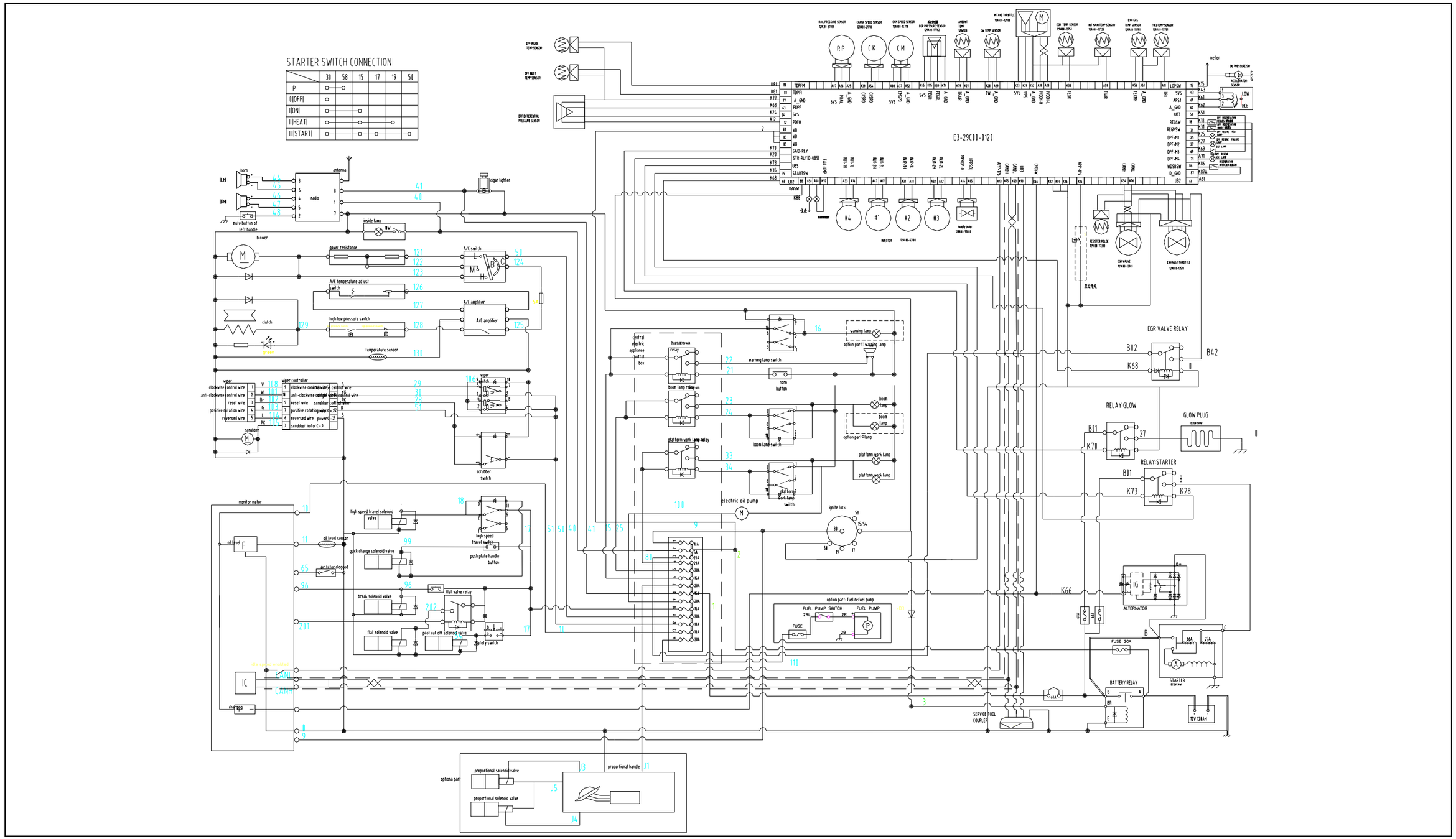
6.7.3 Work Parameters



Unit：mm

Machine specification		SWE70F
a	Max digging height	5970
b	Max dumping height	4160
c	Max digging depth	4065
d	Max vertical digging depth	2890
e	Max digging radius	6335
f	Max reach at ground level	6210
g	Max.lifting height of dozer blade	475
h	Max.digging depth of dozer blade	290
r	Minimum swing radius	2415

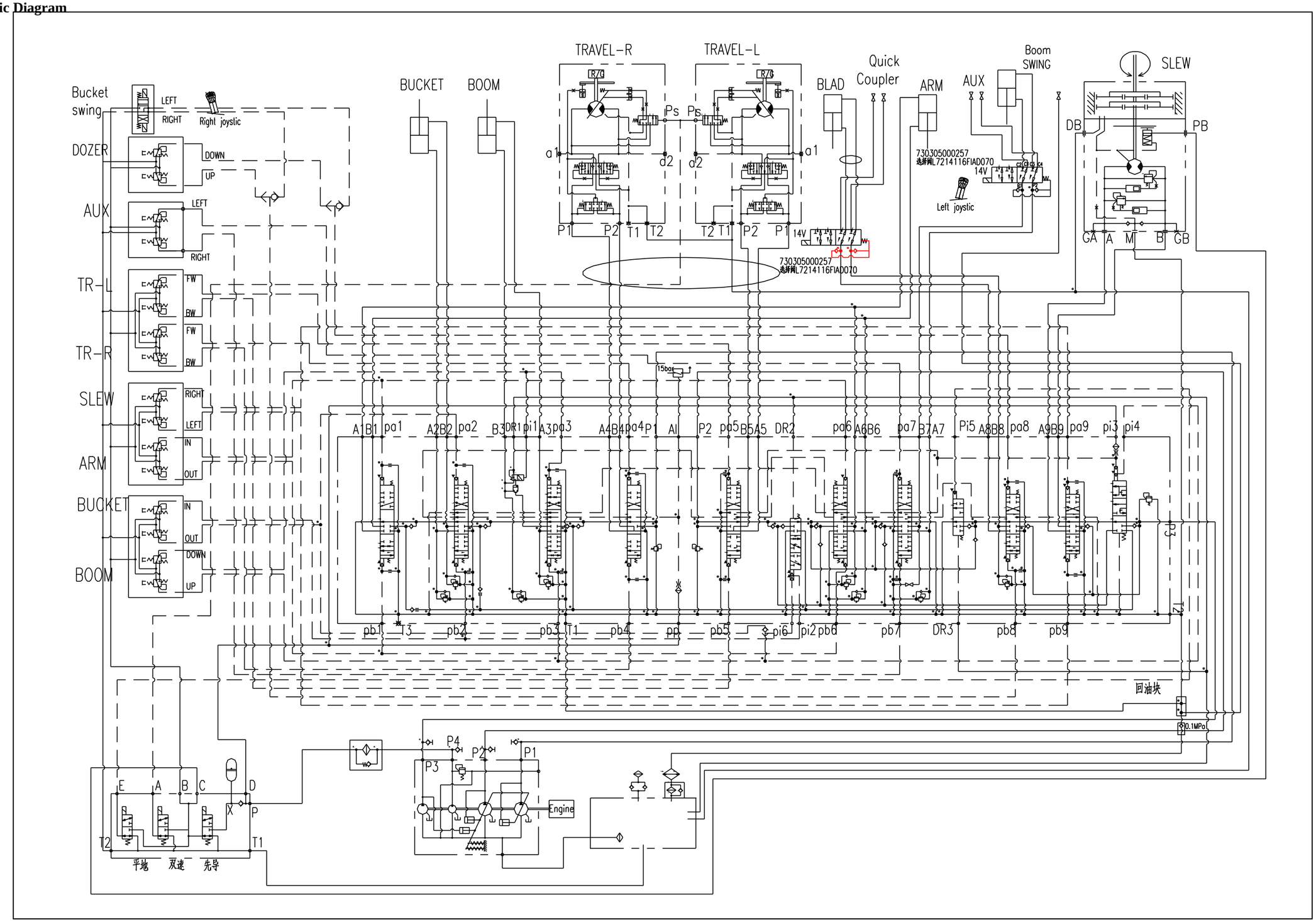
6.7.4 Circuit Diagram



6.7.5 Electrical Elements Table

NO.	NAME	NO.	NAME
1	Throttle servo-motor	27	Ignition lock
2	Safety relay	28	Monitor meter
3	Flameout control relay	29	Warm up relay
4	Fuel valve relay	30	Controller
5	Starter	31	Electric oil pump
6	Head light relay	32	Radio
7	generator	33	Washer assy.
8	Water temperature sensor	34	Wiper controller
9	Air filter indicator	35	Horn
10	Overheat warning switch	36	Lighter
11	Engine oil pressure warning switch	37	GPS
12	Solenoid power switch	38	Electric control case assy.
13	Throttle dail plate	39	Connector
14	Work light	40	Single core plug
15	Oil level sensor	41	1S Delayed module
16	Micro-active switch	42	15S Delayed module
17	Press button switch end mounting frame	43	Standby relay 1
18	Press button switch mid-frame	44	Standby relay 2
19	Auto-idle switch	45	Standby relay 3
20	Quick selection switch	46	Horn relay
21	Front light switch	47	Fuel gasoline pump
22	Work light switch	48	18 Core junctor
23	Alarm light switch	49	22 Core junctor
24	Wiper switch	50	Warning lamp
25	Washer switch	51	Accumulator100Ah
26	Rocker switch cover	52	Battery clamp（with protective）

6.7.6 Hydraulic Diagram



6.7.7 Hydraulic Elements Table

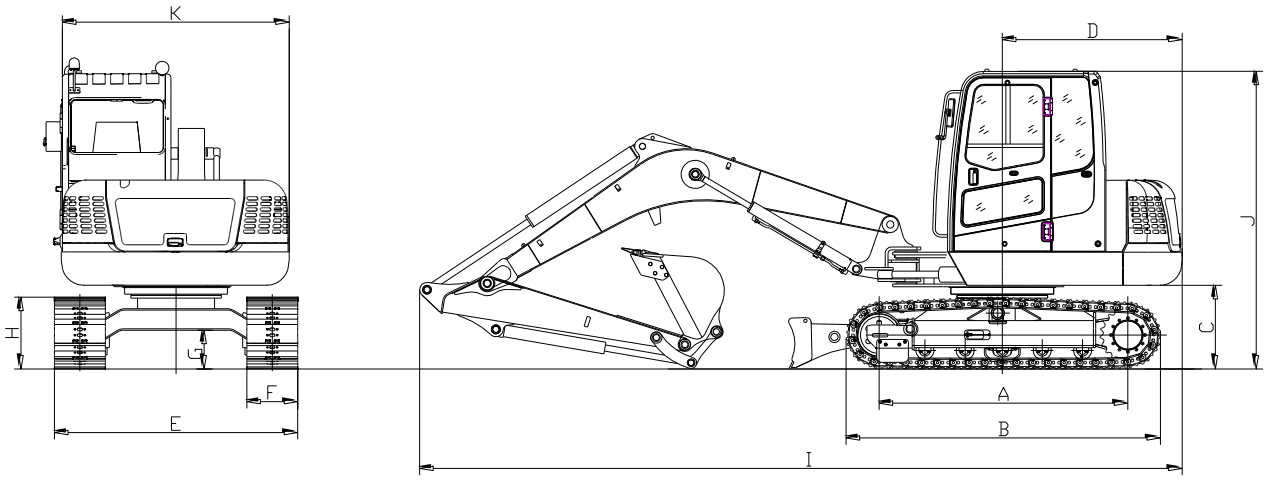
No.	Name	Qty
1	Main valve	1
2	Main pump	1
3	Swing motor	1
4	Right travel motor	1
5	Left travel motor	1
6	Central swing joint	1
7	Left pilot handle	1
8	Right pilot handle	1
9	Double couple foot valve	1
10	Pilot filter	1
11	Low pressure valve group	1
12	Boom cylinder	2
13	Arm cylinder	1
14	Bucket cylinder	1
15	Deflection cylinder	1

6.8 SWE80F TECHNICAL SPECIFICATION

6.8.1 Machine Specification

Machine Model		SWE80F
Operating weight	Equipped with rubber track	7810 kg
	Equipped with steel track	7860 kg
Standard bucket capacity		0.28 m3
Track shoe width		450 mm
Power plant		
Engine model		4TNV98C-SSU
Type		Direct injection, water cooled, 4 strokes
Number of cylinders		4
Displacement		3.319 L
Rated power/revs		46.2 kW/2200 rpm
Fuel tank capacity		118 L
Hydraulic system		
Main pump		1 variable plunger pump
Flow capacity		162 L/min
Work pressure setting		26 MPa
Front work attachment (reinforcement)FF		26 Mpa
Travel		26 Mpa
Slewing		26 Mpa
pilot pressure setting		3.9 Mpa
Hydraulic oil tank capacity		96 L
Performance specification		
Slewing speed		10 rpm
Travel speed		4.0/2.4 km/h
Max traction		62 kN
Max grade ability		35 °
Bucket max digging force		53 kN
Arm max digging force		36 kN
Angle of boom deflection		R73 ℅L60 °

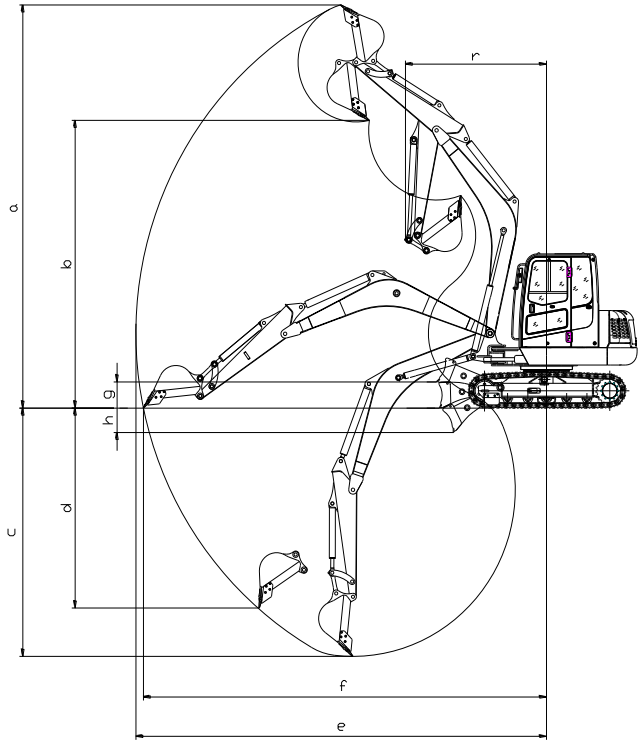
6.8.2 Boundary Dimension



Unit：mm

Machine model		SWE80F
A	Wheel track	2200
B	Track total length	2785
C	Platform ground clearance	745
D	Platform slewing radius	1680
E	Chassis width	2150
F	Track width	450
G	Chassis ground clearance	335
H	Track height	640
I	Total length	6730
J	Cab roof height	2665

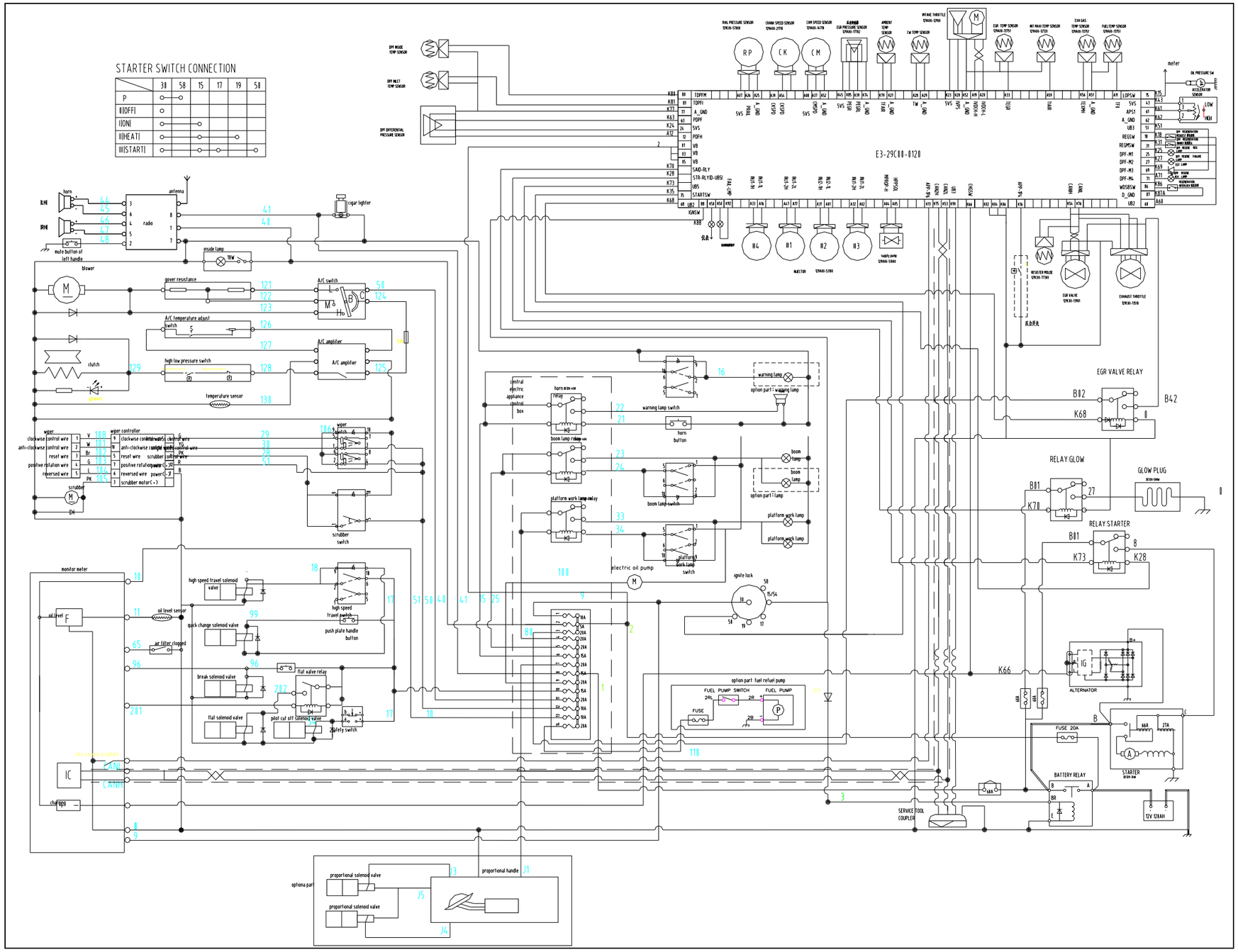
6.8.3 Work Parameters



Unit：mm

Machine specification		SWE80F
a	Max digging height	6820
b	Max dumping height	4870
c	Max digging depth	4195
d	Max vertical digging depth	3365
e	Max digging radius	7115
f	Max reach at ground level	7000
g	Max.lifting height of dozer blade	420
h	Max.digging depth of dozer blade	480
r	Minimum swing radius	2520

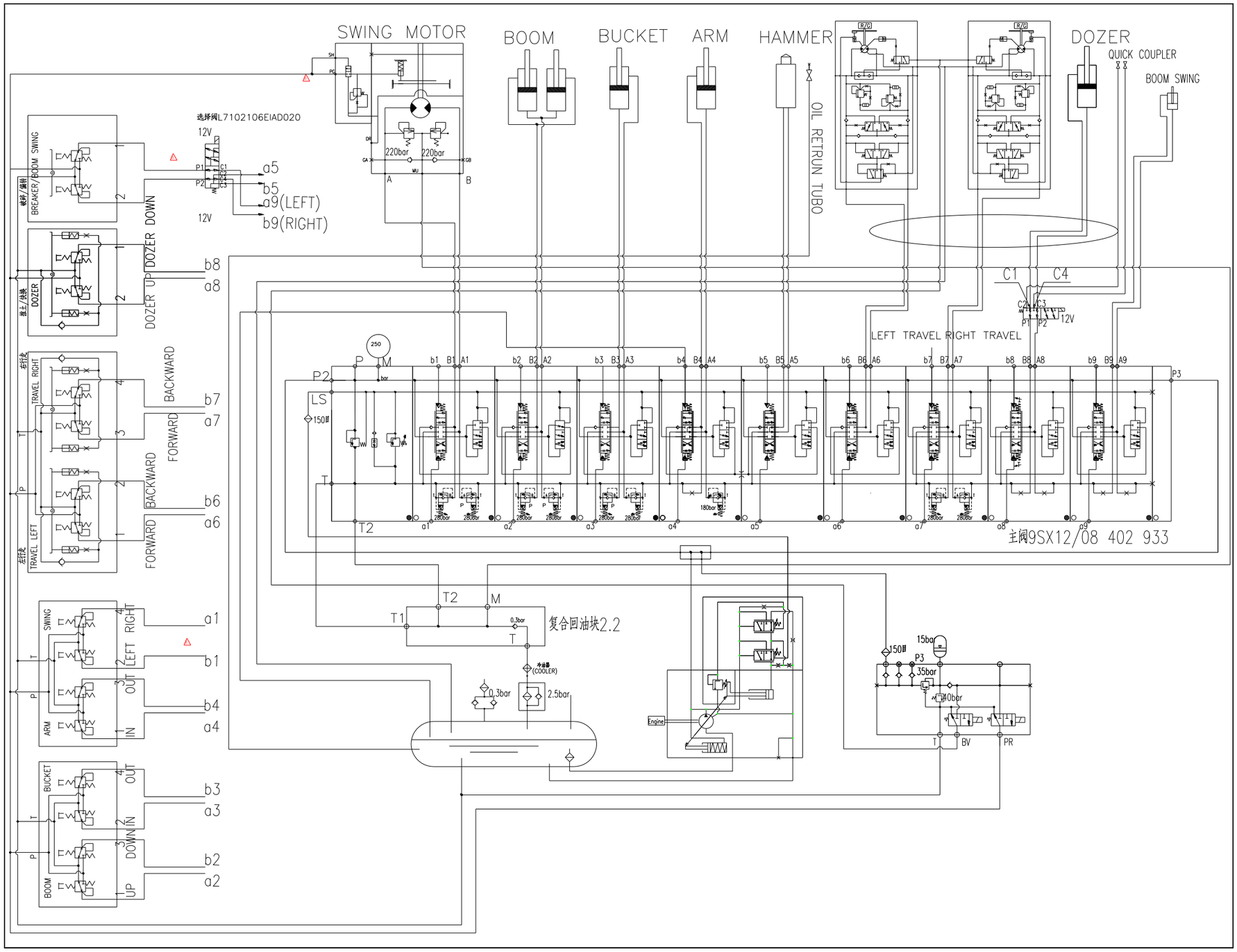
6.8.4 Circuit Diagram



6.8.5 Electrical Elements Table

NO.	NAME	NO.	NAME
1	Throttle servo-motor	27	Ignition lock
2	Safety relay	28	Monitor meter
3	Flameout control relay	29	Warm up relay
4	Fuel valve relay	30	Controller
5	Starter	31	Electric oil pump
6	Head light relay	32	Radio
7	generator	33	Washer assy.
8	Water temperature sensor	34	Wiper controller
9	Air filter indicator	35	Horn
10	Overheat warning switch	36	Lighter
11	Engine oil pressure warning switch	37	GPS
12	Solenoid power switch	38	Electric control case assy.
13	Throttle drive plate	39	Connector
14	Work light	40	Single core plug
15	Oil level sensor	41	1S Delayed module
16	Micro-active switch	42	15S Delayed module
17	Rocker switch end mounting frame	43	Standby relay 1
18	Rocker switch mid-frame	44	Standby relay 2
19	Auto-idle switch	45	Standby relay 3
20	Quick selection switch	46	Horn relay
21	Front light switch	47	Fuel gasoline pump
22	Work light switch	48	18 Core junctor
23	Alarm light switch	49	22 Core junctor
24	Wiper switch	50	Warning lamp
25	Washer switch	51	Accumulator100Ah
26	Press button switch cover	52	Battery clamp（with protective）

6.8.6 Hydraulic Diagram



6.8.7 Hydraulic Elements Table

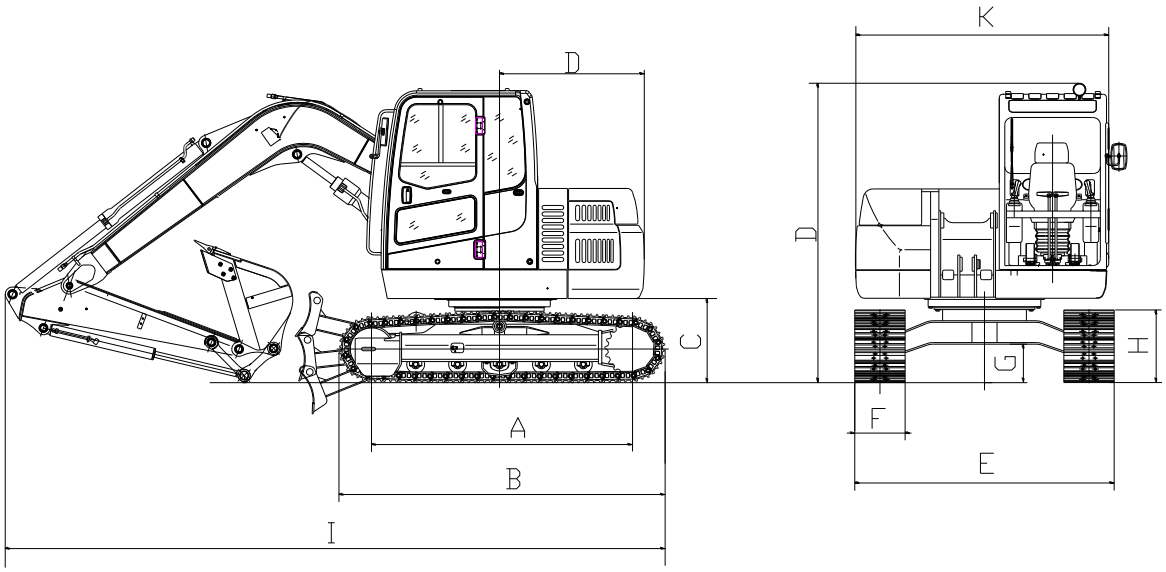
No.	Name	Qty
1	Main valve	1
2	Main pump	1
3	Swing motor	1
4	Right travel motor	1
5	Left travel motor	1
6	Central swing joint	1
7	Left pilot handle	1
8	Right pilot handle	1
9	Double couple foot valve	1
10	Pilot filter	1
11	Low pressure valve group	1
12	Boom cylinder	2
13	Arm cylinder	1
14	Bucket cylinder	1
15	Deflection cylinder	1

6.9 SWE90UF TECHNICAL SPECIFICATION

6.9.1 Machine Specification

Machine model		SWE90UF
Operating weight	Equipped with rubber track	8160 kg
	Equipped with steel track	8340 kg
Standard bucket capacity		0.28 m^3
Track shoe width		450 mm
Power plant		
Engine model		4TNV98C
Type		Direct injection, water cooled, 4 strokes
Cylinder number		4
Displacement		3.319 L
Rated power/revs		46.2 kW/2200 rpm
Fuel tank capacity		120 L
Hydraulic system		
Main pump		1 variable plunger pump
Flow		160 L/min
Work pressure		30 MPa
Front work attachment(reinforcement)		30 Mpa
Travel		30 Mpa
Slewing		24.5 Mpa
Pilot pressure		3.5 Mpa
Hydraulic oil tank capacity		100 L
Performance specification		
Slewing speed		11 rpm
Travel speed		4.5/2.7 km/h
Max traction		66.8 kN
Max grade ability		35 °
Bucket max digging force		63.5 kN
Arm max digging force		37.5 kN

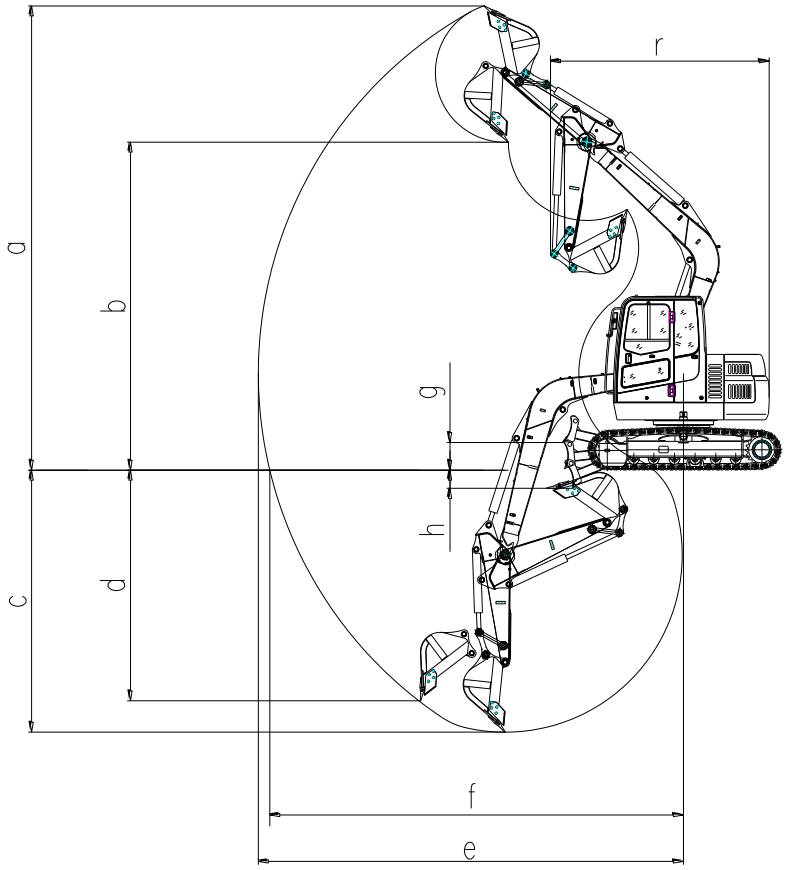
6.9.2 Boundary Dimension



Unit：mm

Machine specification		SWE90UF
A	Wheel track	2250
B	Track total length	2892
C	Platform ground clearance	790
D	Platform slewing radius	1420
E	Chassis width	2250
F	Track width	450
G	Chassis ground clearance	390
H	Track height	660
I	Total length	6510
J	Cab roof height	2700

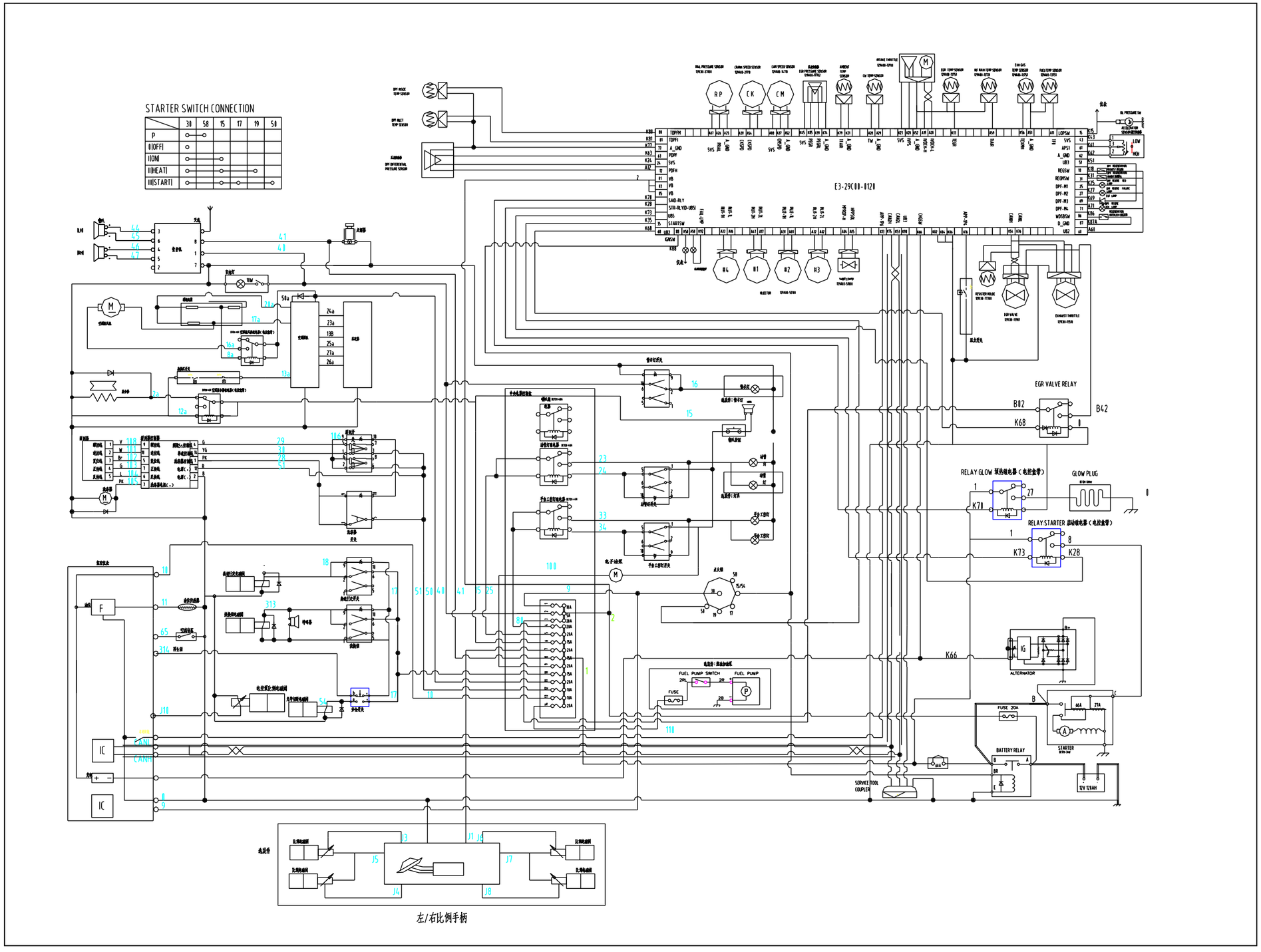
6.9.3 Work Parameters



Unit：mm

Machine model		SWE90UF
a	Max digging height	7300
b	Max dumping height	5235
c	Max digging depth	4630
d	Max vertical digging depth	3890
e	Max digging radius	7460
f	Max reach at ground level	7300
g	Max.lifting height of push plate	465
h	Max.digging depth of push plate	535
r	Minimum swing radius	2580

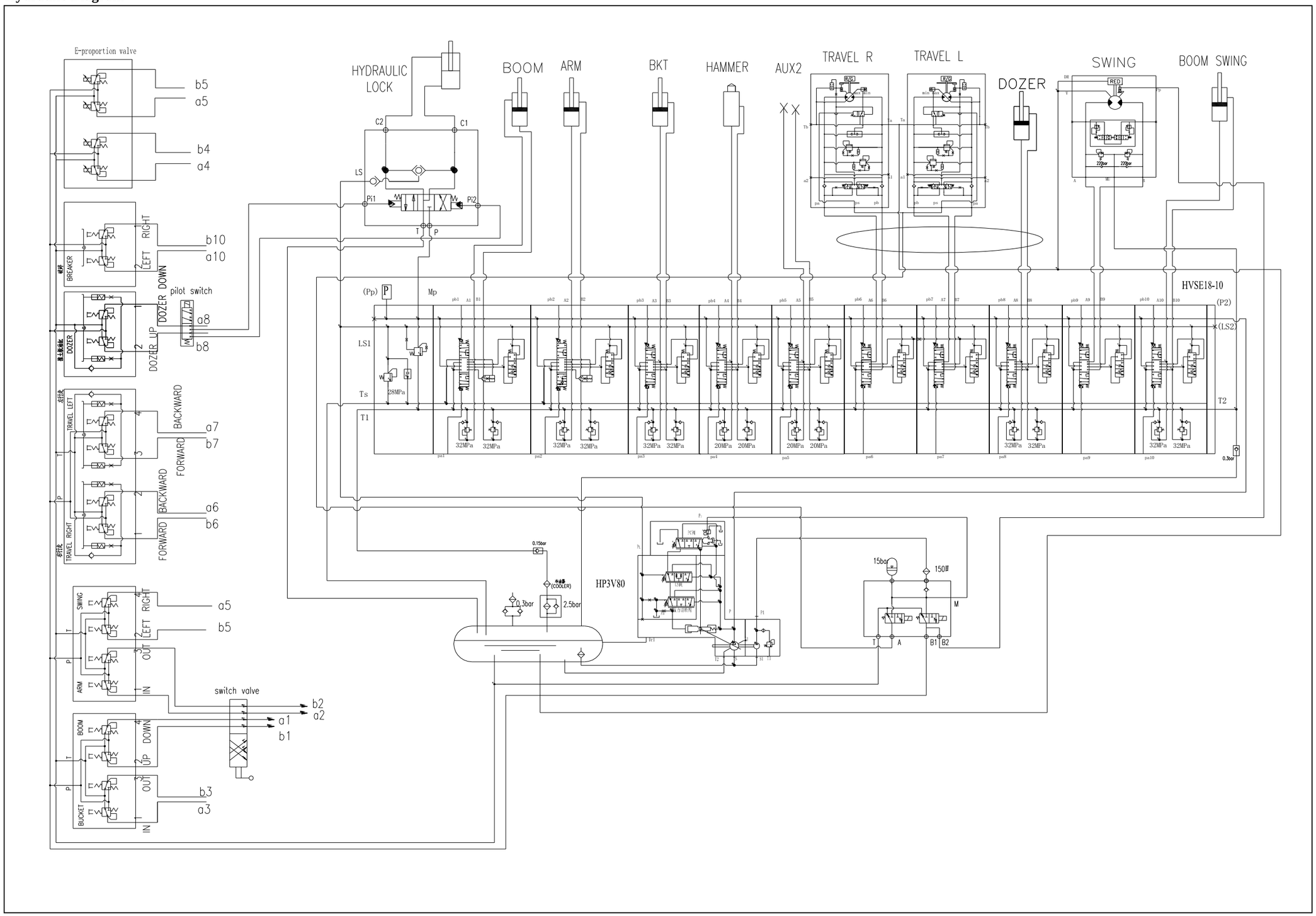
6.9.4 Circuit Diagram



6.9.5 Electrical Elements Table

NO.	NAME	NO.	NAME
1	Throttle servo-motor	27	Ignition lock
2	Safety relay	28	Monitor meter
3	Flameout control relay	29	Warm up relay
4	Fuel valve relay	30	Controller
5	Starter	31	Electric oil pump
6	Head light relay	32	Radio
7	generator	33	Washer assy.
8	Water temperature sensor	34	Wiper controller
9	Air filter indicator	35	Horn
10	Overheat warning switch	36	Lighter
11	Engine oil pressure warning switch	37	GPS
12	Solenoid power switch	38	Electric control case assy.
13	Throttle drive plate	39	Connector
14	Work light	40	Single core plug
15	Oil level sensor	41	1S Delayed module
16	Micro-active switch	42	15S Delayed module
17	Press button switch end mounting frame	43	Standby relay 1
18	Press button switch mid-frame	44	Standby relay 2
19	Auto-idle switch	45	Standby relay 3
20	Quick selection switch	46	Horn relay
21	Front light switch	47	Fuel gasoline pump
22	Work light switch	48	18 Core junctor
23	Alarm light switch	49	22 Core junctor
24	Wiper switch	50	Warning lamp
25	Washer switch	51	Accumulator100Ah
26	Rocker switch cover	52	Battery clamp（with protective）

6.9.6 Hydraulic Diagram



6.9.7 Hydraulic Elements Table

No.	Name	Qty
1	Main valve	1
2	Main pump	1
3	Swing motor	1
4	Right travel motor	1
5	Left travel motor	1
6	Central swing joint	1
7	Left pilot handle	1
8	Right pilot handle	1
9	Double couple foot valve	1
10	Pilot filter	1
11	Low pressure valve group	1
12	Boom cylinder	2
13	Arm cylinder	1
14	Bucket cylinder	1

7. OPERATION INSTRUCTION OF ACCESSORY

7.1 SAFETY ITEMS

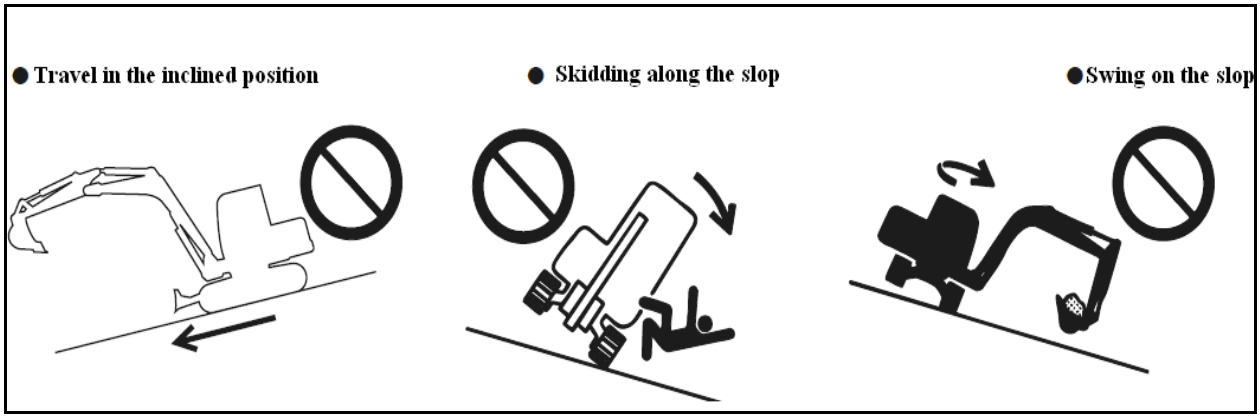
Warning：

- Please consult Sunward dealer before install option parts；
- Do not use other option attachment which is not agreed by Sunward or Sunward dealer, or,it will influent machine life and other safety problems.
- Sunward will be not responsible for any hurt, accident or machine damage which is caused by unauthorized option attachment;
- According to the statement, vibration noise will difficult to make co-work send operation instruction. Before operating, please appoint one conductor and make sure the signal.
- Select flat、hard ground to operate and make sure good lighting and ventilation
- Clear up spot, clear away objects which are dangerous and obstacles,leaked lubricating oil and grease.
- Appoint one person conduct operating and obey him when the machine is lifting.
- When install or demount operation device, Make sure the machine stop stability and avoid tipping.
- Unauthorized person is not allowed in the working area, because of loading objects fall down or have the dangerous to be hurt.
- When lift or transport heavy objects (exceed 25KG), please use crane.
- Replace optional operation device or other special operation device, please running first and then check oil level, if it necessary, please filling oil.please consult local Sunward dealer about specifical assembly and disassembly.

7.2 NOTICE FOR ASSEMBLING ATTACHMENT

Warning：

- **Lengthened or heavy work attachment will decrease the stability of machine, so if machine travel or swing on the slop, it will tip. The following operation is dangerous, don't operate the machine as follows.**



1.When the machine downhill, please attention to decrease center of gravity of work device to prevent forward,

2. Forbid travelling in inclined to prevent machine roll over.

3. Forbid swing on the slope.

4.After installing the heavy work equipment, machine swing flight will increase.Therefore, misjudgment will-make-the machine will crash surrounding objects, and the surrounding-o

bjects should allow sufficient margin-whenoperation. In addition, natural subsidence will increase (when the d evice stopped working in mid-air, under its own gravity, will gradually decline

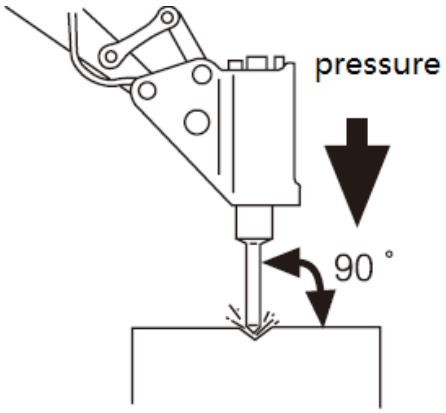
5. After installing work attachment, work range will suddenly become larger, so it has the dangerous of corrosion objects and misjudged distance. When operate work attachment, please keep distance to any object in the area.

7.3 HYDRAULIC QUARTERING HAMMER

1、Different model of Excavator mounting with different model of hydraulic quartering hammer, before mounting hydraulic quartering hammer, please consult Sunward to comfirm the model.

7.3.1 Main Use of Hydraulic Quartering Hammer

a) Stone crush
b) Demolition of building
c) Road construction



7.3.2 Hydraulic Quartering Hammer Assembly

Sunward compact excavator standard collocation is breaking pipeline, including hydraulic circuit, stop valve, they are located at two sides of arm, the end of pipeline is the quick joint which is connect accessory, as the following figure.

Connected the oil in and oil return port of hydraulic breaking hammer, then it opens stop valve easily. Please closed stop valve before dismantle and assembly pipeline to prevent hydraulic oil

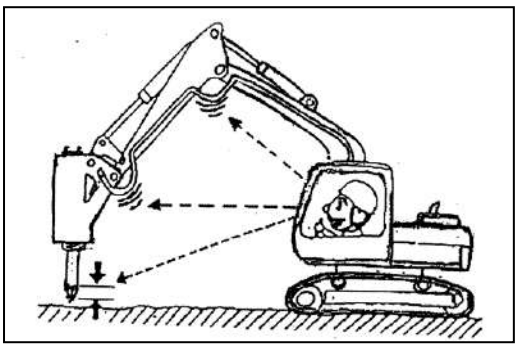
7.3.3 Hydraulic Quartering Hammer Control

Breaking is controlled by left pedal of travel operation rod

Please open the misoperation pedal firstly when it needs to operate.

Left foot step on right side of control plate, breaking hammber begin to work.

In order to prevent misoperation, please cover the protective lid when there is no need to operate break hammer.



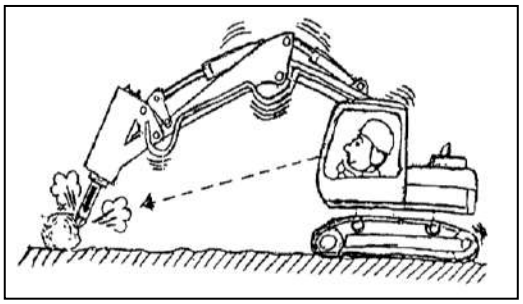
7.3.4 Safe Operation of Hydraulic Quartering Hammer

a) Please stop operating when oil tube has big vibration

When high and low pressure oil tube of quartering hammer over vibration, please disassembly and repair, and then contact with nearest Sunward service after sale.

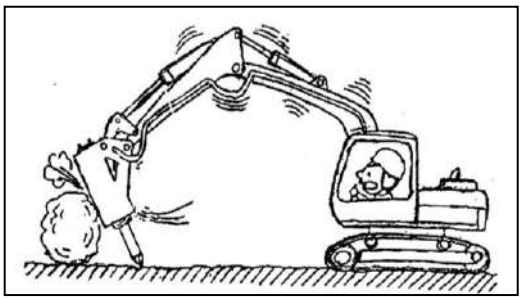
b) Forbid empty hitting

Once the rock hit, immediately stop ,because the continuous empty-hitting not only can damage the drill rod and flat sales, but also damage to the mechanical load, when rod position is incorrect or when used it-as a lever occ urs runaway. (Percussion sounds will change when runaway)



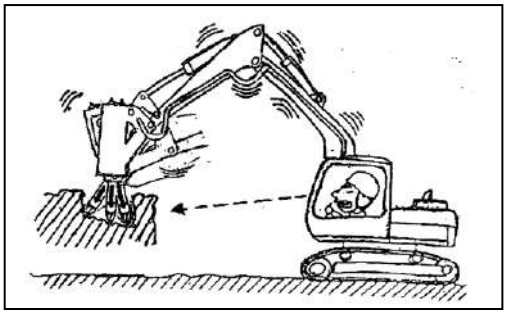
c) Forbid to push rock

Forbid using side wall of quartering hammer to push rock, because this is the main factor of damage bolt of quartering hammer ,drill.



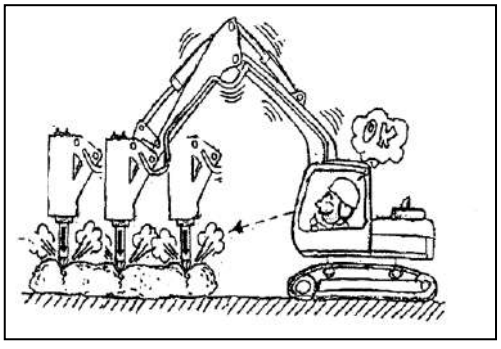
d) Do not take drill shank as crowbar

When take drill shank as crowbar, bolt and drill shankwill be damaged.



e) Do not continue to beat over 1 minute

When Quartering hammer continue to hit over 1 minute, rock still not be crushed, please replace hitting point and continue to hit, continue to hit at the same place will quickly wear drill shank.

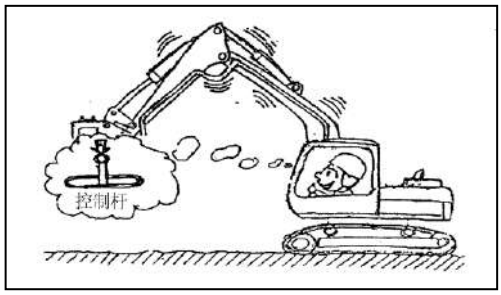


f) Please from edge to crush big and hard rock.

From crack or edge begin to hit ,big and hard rock is easy to be crushed.

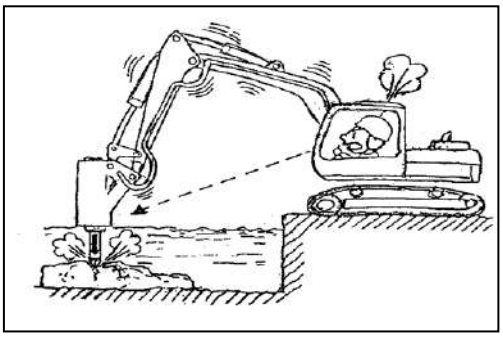
g) Operate quartering hammer with proper engine speed

Operate quartering hammer with proper engine speed, high engine speed not only not improve hitting power of quartering hammer, but also make high oil temperature to damage piston and valve.



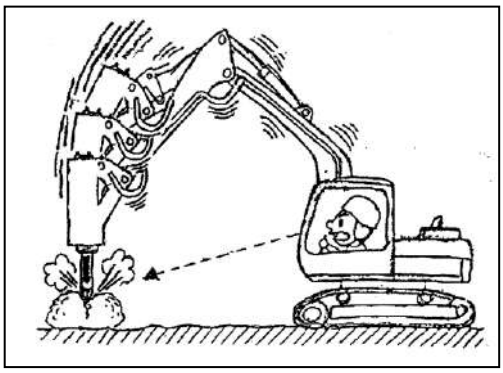
h）Do not operate quartering hammer in the water or mud

When parts except drill shank sink in the water or mud, please stop operating quartering hammer, because piston and related parts will have mud and make quartering hammer be damaged beforehand.



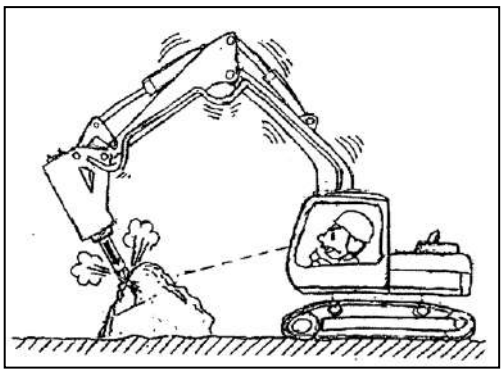
i）Do not hit the rock with falling part of quartering hammer

Hit the rock with falling part of quatering hammer that will cause counter-acting force to quatering hammer and the loaded mechaninery, thus, damage the hammer parts and the machine.



j) Do not hit on the limit position of loaded machine cylinder

When hit on the limit position of loaded machine cylinder(machine boom completely stretched or shortened), arm and every part of loaded machine will be damaged.



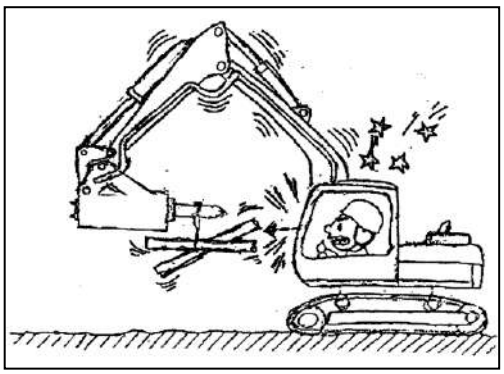
k） Do not use quartering hammer lift objects

Lift object on quartering hammer or drill shank, it will not only damaged quartering hammer but also very dangerous.

l) Replace hydraulic oil and core of hydraulic tank

When use hydraulic quartering, hydraulic oil will go bad quicker than daily excavate, so it must frequently replace hydraulic oil and core, if replace hydraulic oil and core do not on time, it will damage machine and hydraulic system of

quartering hammer. In order to improve life of hydraulic system, please according to the table to replace hydraulic oil and core, the replace time please check chapter 3.9.2(replace hydraulic oil and core).



7.4 OPTIONAL PARTS LIST

SWE50B optional list

Arm	Length of arm	
Standard arm	1500mm	
Lengthen arm 1	1800mm	

Bucket	Rated bucket capacity	Cutting width
Standard bucket	0.18m ^{3}	660mm

Quick device		
Option quick device 1	Finland quick	Equipped with special bucket
Option quick device 2	Italy quick	

SWE60B optional list

Arm	Length of arm	
Standard arm	1600mm	
Lengthen arm 1	1900mm	
Lengthen arm 2	1760mm	

Bucket	Rated bucket capacity	Cutting width
Standard bucket	0.22m ^{3}	780mm
Option bucket 1（desilting bucket）	-----	1500mm
Option bucket 2（ditch cleaning bucket）	0.08m ^{3}	300mm

Quick device		
Option quick device 1	Finland quick	Equipped with special bucket
Option quick device 2	Italy quick	

SWE70B、SWE70F optional list

Arm	Length of arm	
Standard arm	1610mm	
Lengthen arm 1	1910mm	
Lengthen arm 2	1810mm	

Bucket	Rated capacity	Cutting width
Standard bucket	0.26m ³	740mm
Option bucket 1（desilting bucket）	-----	1500mm

Quick device		
Option quick device 1	Finland quick	Equipped with special bucket
Option quick device 2	Italy quick	

SWE80B、SWE80F optional list

Arm	Length of arm	
Standard arm	1830mm	
Lengthen arm	2030mm	

Bucket	Rated capacity	Cutting width
Standard bucket	0.30 m ³	810mm
Option bucket 1	0.35m ³	840mm
Option bucket 2（ditch cleaning bucket）	0.13m ³	370mm

Quick device		
Option quick device 1	Finland quick	Equipped with special bucket
Option quick device 2	Italy quick	

SWE90U、SWE90UF optional list

Arm	Length of arm	
Standard arm	1620mm	
Lengthen arm	1920mm	

Bucket	Rated capacity	Cutting width
Standard bucket	0.26m ³	750mm
Option bucket 1	0.12m ³	350mm
Option bucket 2（desilting bucket）	-----	1500mm

Quick device		
Option quick device 1	Finland quick	Equipped with special bucket
Option quick device 2	Italy quick	

8 MANUFACTURE INFORMATION

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