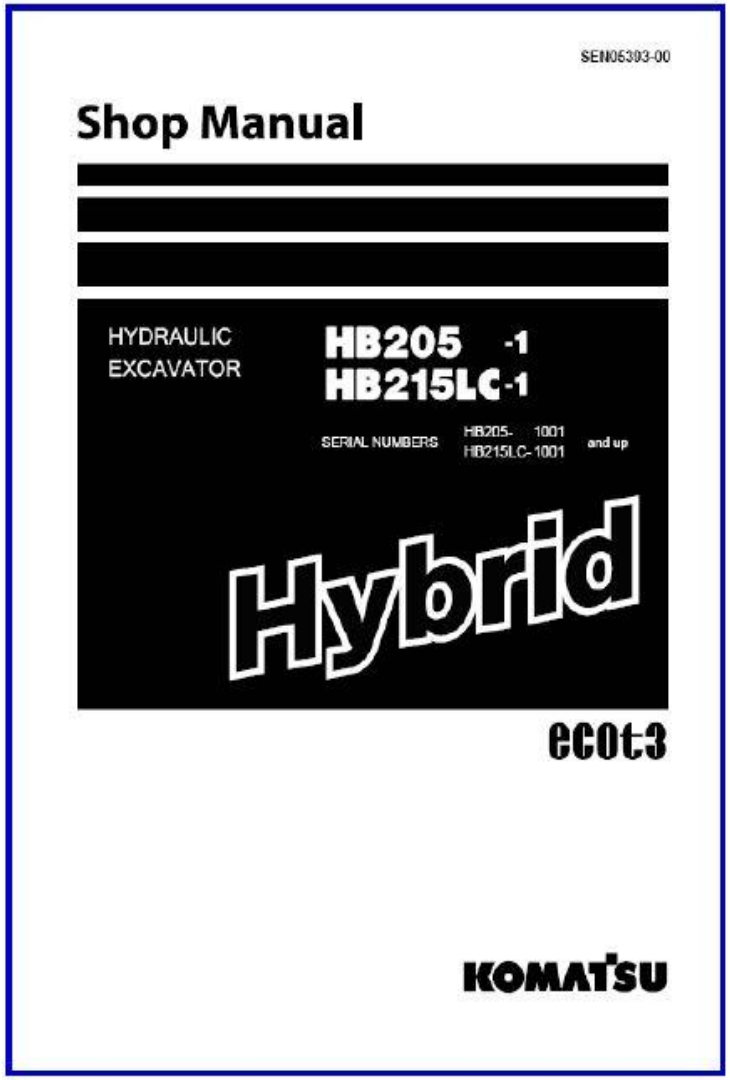
Hirepool

KOMATSU

Operator Training
for
HB 205-1 & 215-1

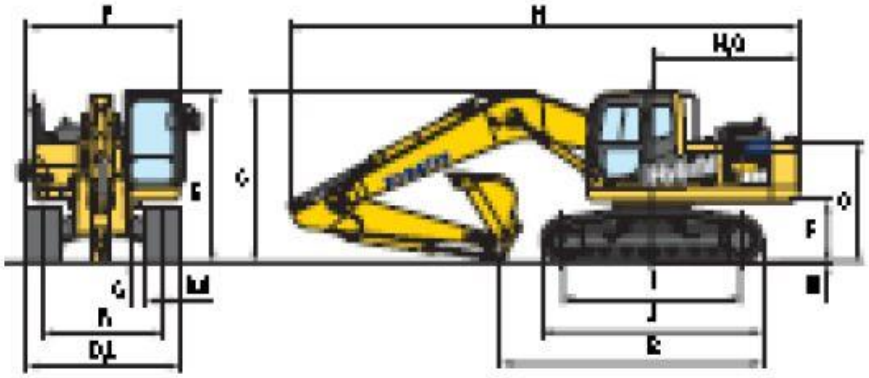
Operation & Maintenance Manual



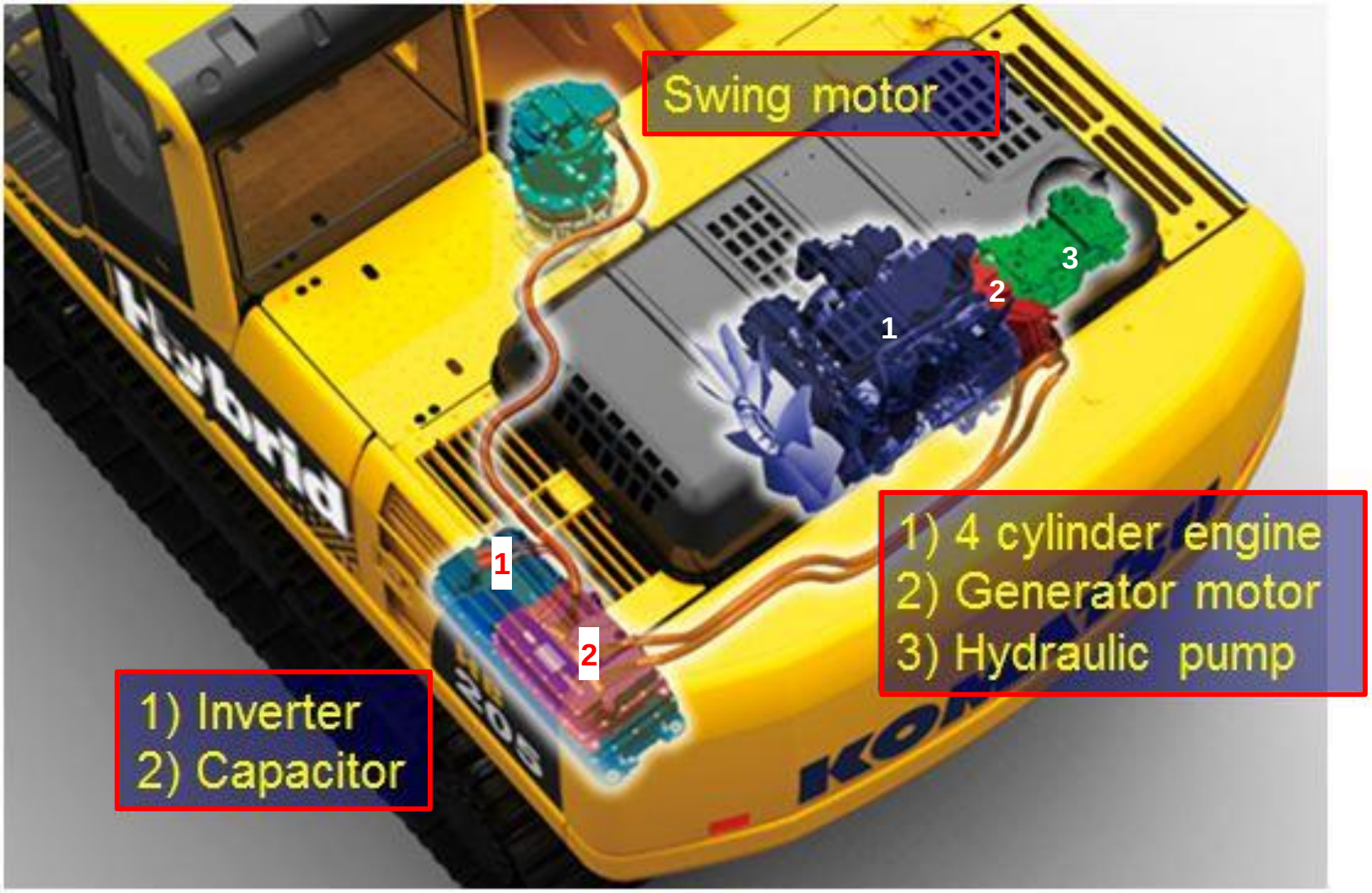
- Keep with machine
- Accessible to all personnel
- Manual Content
  - ❑ 1: Forward
  - ❑ 2: **Safety**
  - ❑ 3: **Operation**
  - ❑ 4: **Maintenance**
  - ❑ 5: Specifications
  - ❑ 6: Attachments, options
  - ❑ 7: Index

Basic Specifications

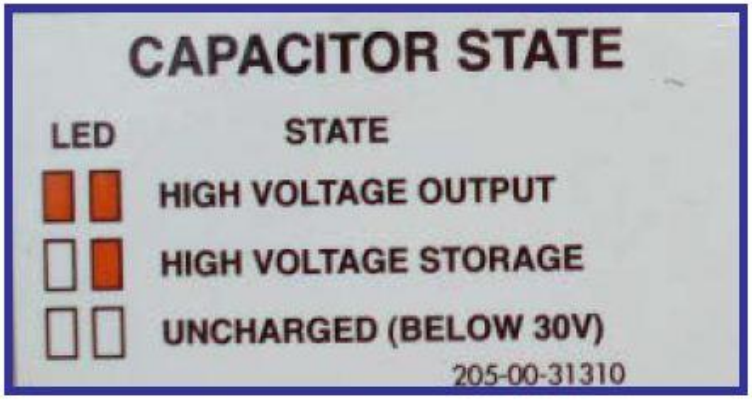
- **Weight** – HB205-1 600mm Grousers **20200kg**
  HB215LC-1 600mm Grousers **21220kg**
- **Height ROPS** – 3.055m
- **Width 600mm Grousers** HB205-1 = 2800mm
  HB215LC-1 = 3080mm
- **Komatsu SAA4107E-1A Engine**
- Turbo charged, water cooled, four cylinder, direct injection
- **Net Horsepower**
  104 kW 139 HP @ 2000 rpm
- **Gross Horsepower**
  110 kW 148 HP @ 2000 rpm

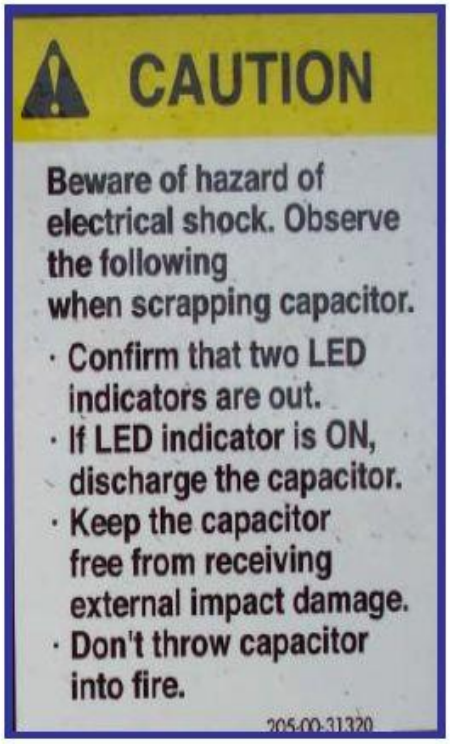


Overview of Komatsu Hybrid System



There are four Safety labels for the Hybrid Machine These four labels occupy eight different locations on the machine and can be located in the O&M manual under Location of safety labels 2 – 6.



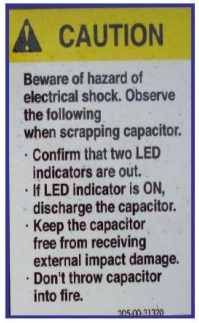


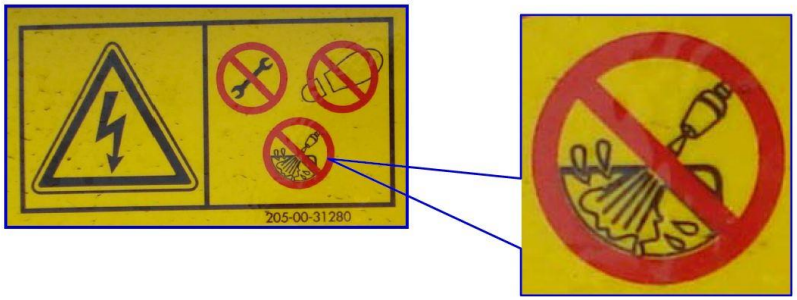
Only Trained and Authorised trade qualified personal are to carry out work on Hybrid machines

Precautions

1. Do not disassemble
2. Do not step on Hybrid system
3. Do not high-pressure wash
4. Located in FIVE places on the machine.

There are four Safety labels for the Hybrid Machine These four labels occupy eight different locations on the machine and can be located in the O&M manual under Location of safety labels 2 – 6.





Pressure washing Generator motor, Inverter, capacitor and swing motor or around these components is strictly prohibited.

Never step on any of the Hybrid system components.

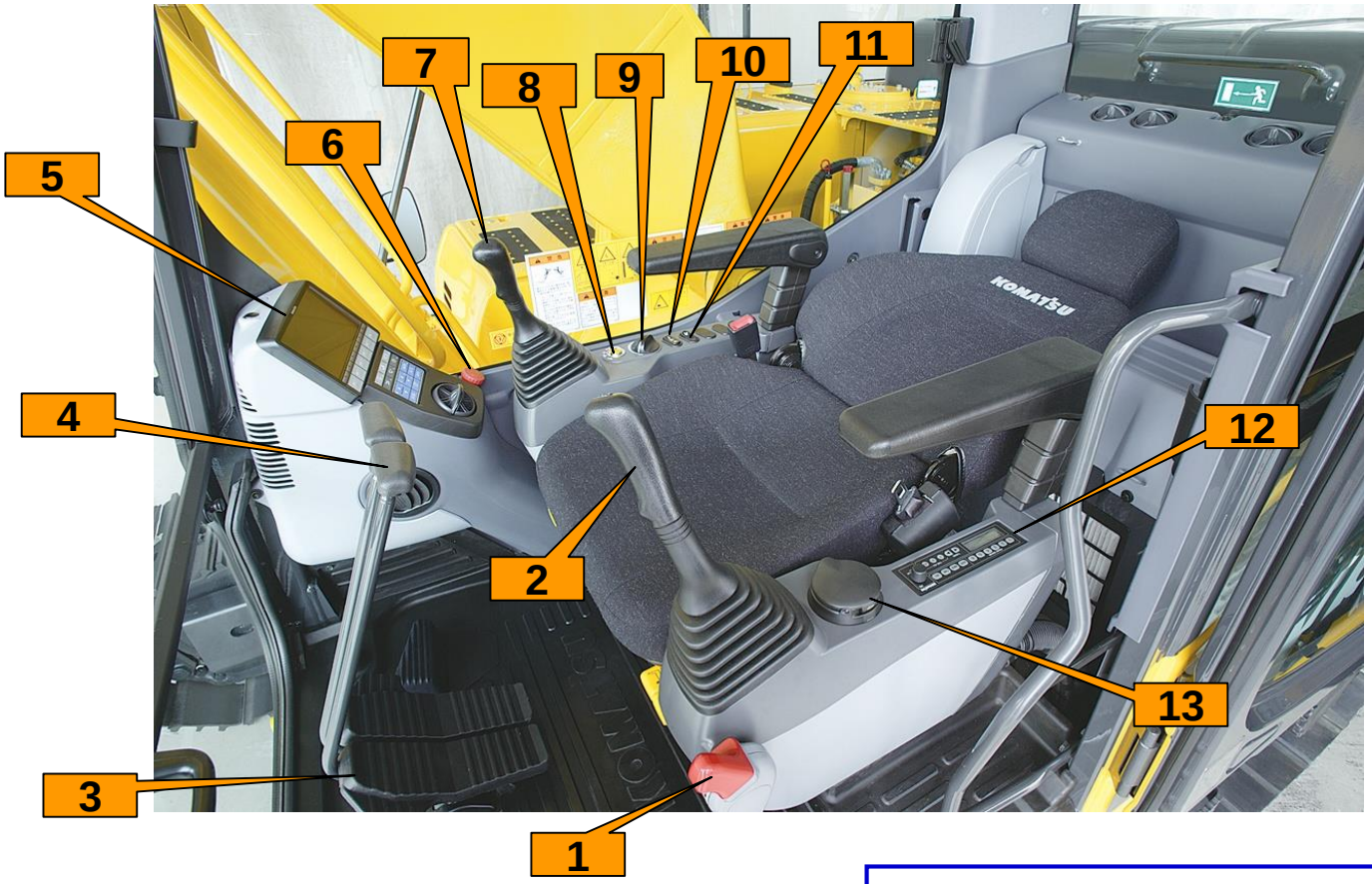
Welding

- When welding on the body of the machine disconnect all wiring harness connectors and ground cable connected to the inverter and capacitor.
- Connect welding ground cable as close as possible to the welding point.

Machine in water

- **If the machine is submerged in water during operation, turn ignition key off immediately and get away from the machine.**
- **If the machine is submerged in water when it is stopped, leave the machine as it is and contact your Komatsu distributor.**

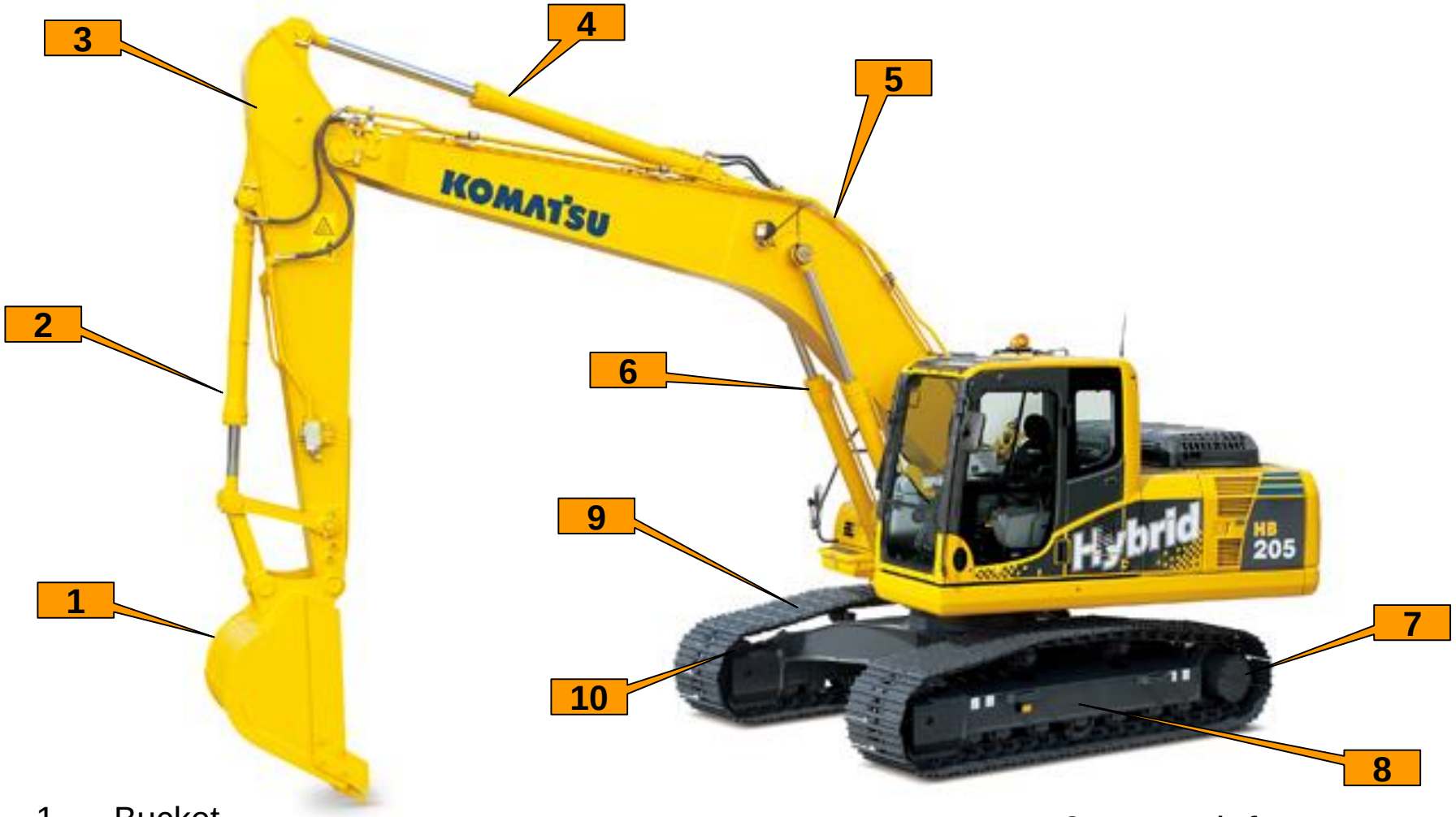
General view of controls & gauges



1. PPC lock lever
2. Left work equipment control lever with one touch power max button
3. Travel pedals
4. Travel levers
5. Machine monitor
6. Emergency swing stop switch

7. Right work equipment control lever with horn switch
8. Start switch
9. Fuel control dial
10. Lamp switch
11. Swing lock switch
12. Radio
13. Ash Tray

General view of machine



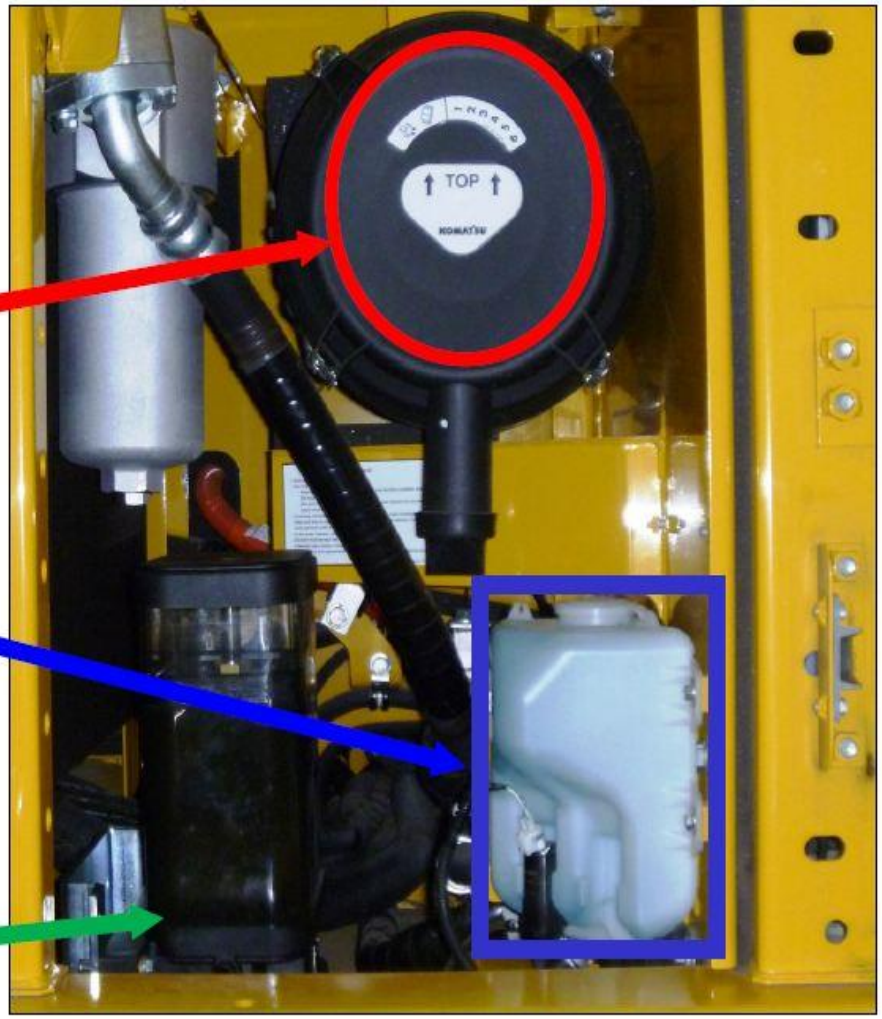
1. Bucket
2. Bucket cylinder
3. Arm
4. Arm cylinder
5. Boom
6. Boom cylinder
7. Final drive and Sprocket
8. Track fame
9. Track shoe
10. Idler

Check Air Filter and Windscreen Washer Bottle (front LH door)

Primary & Secondary Filter Element

Windscreen Washer Bottle

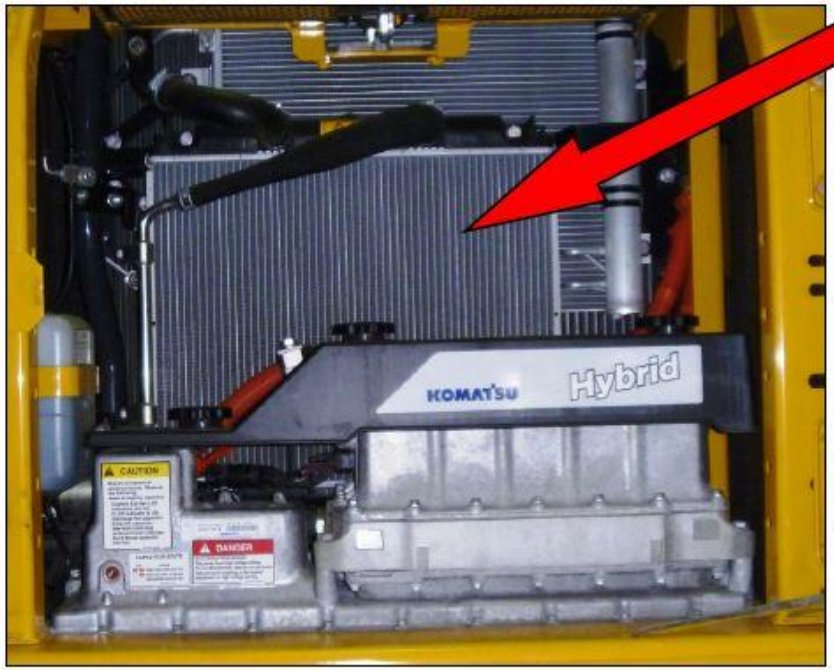
Auto Grease unit & filler point

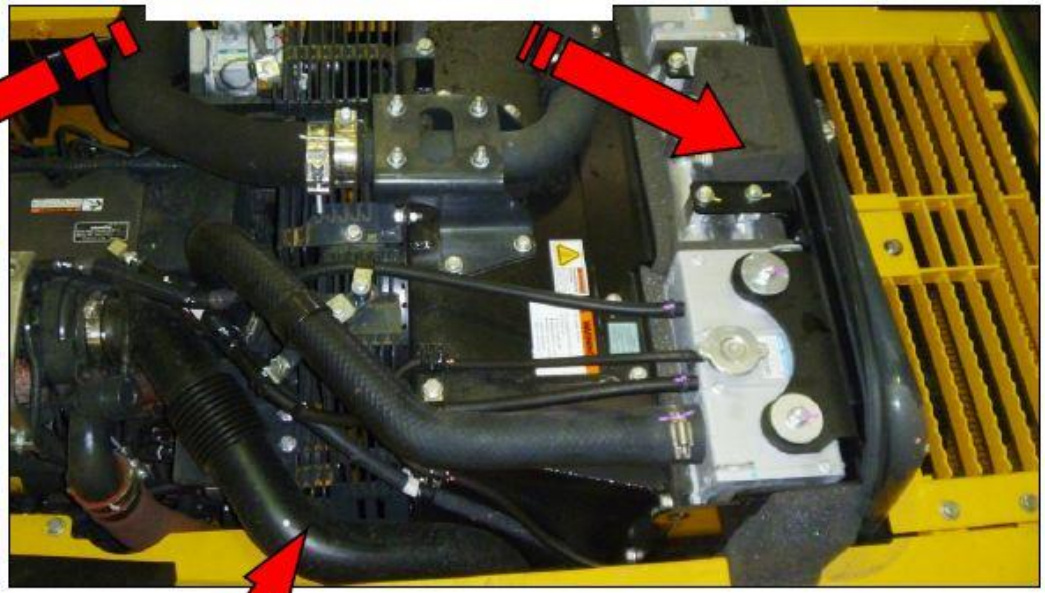


Engine Coolers and Fan

Check Coolant via sub tank, Radiator cap is a service check only

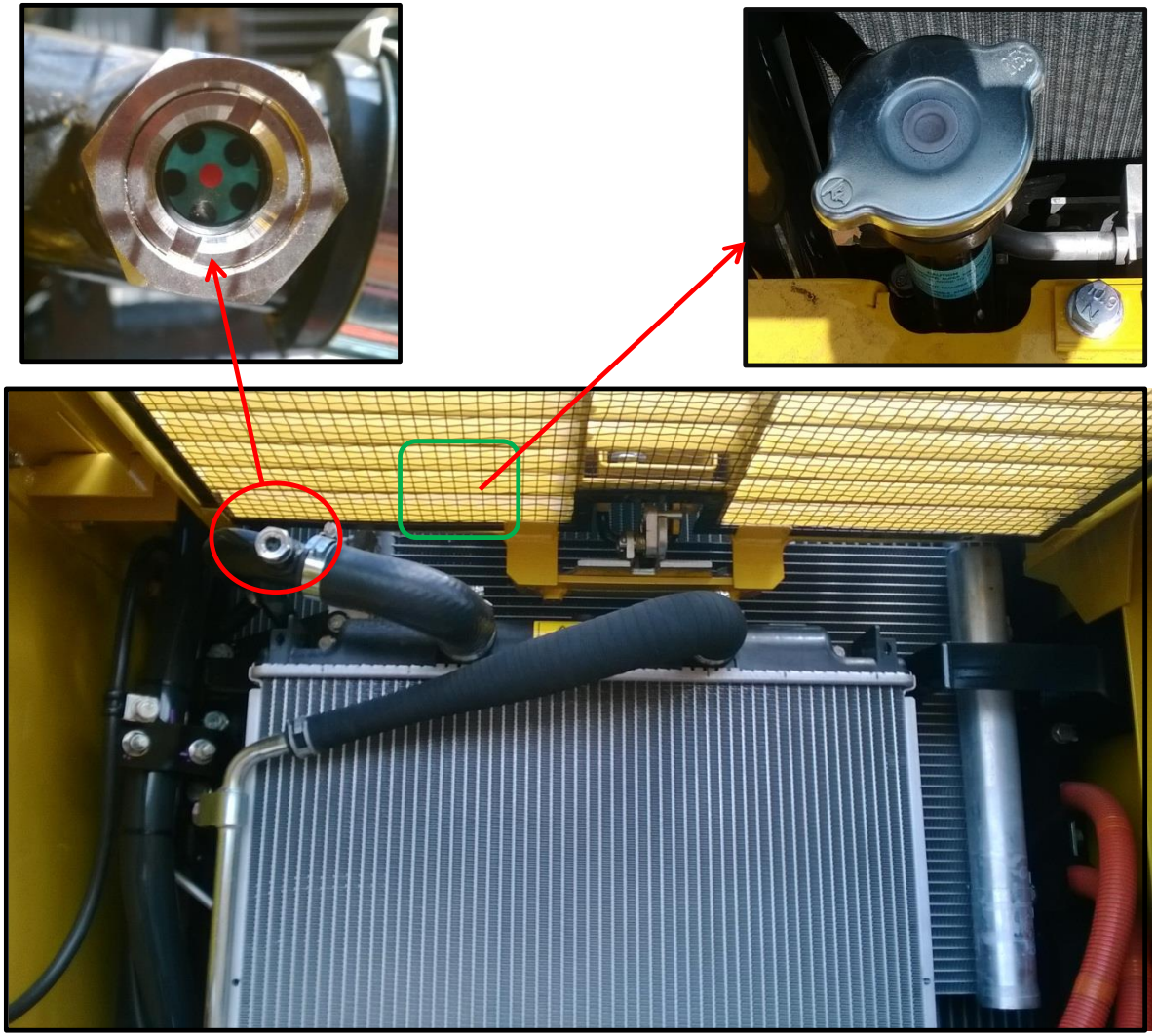
Check Coolers





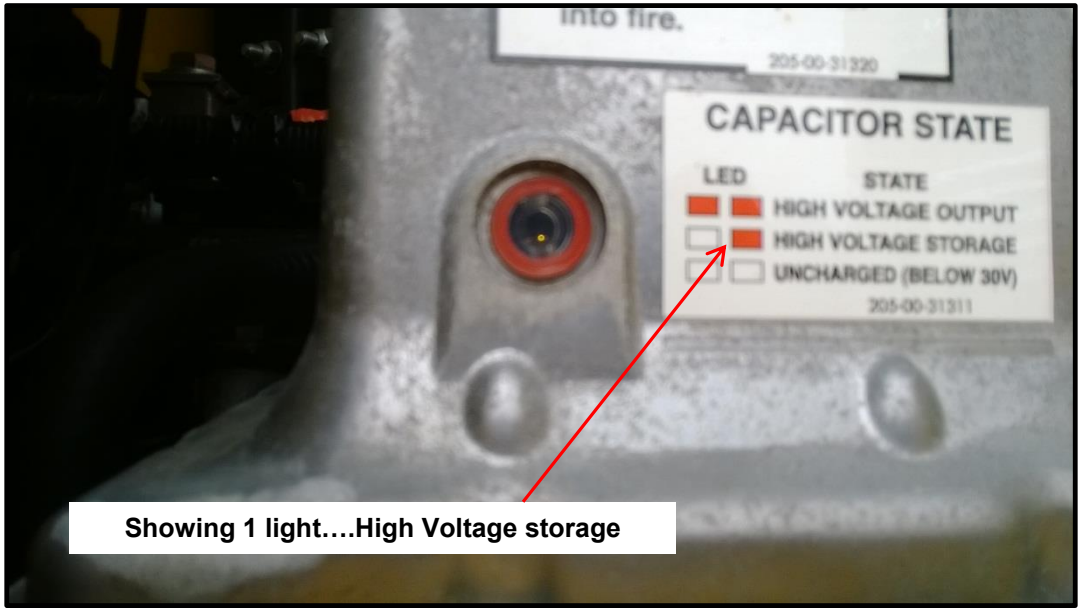
Check Fan and Belts

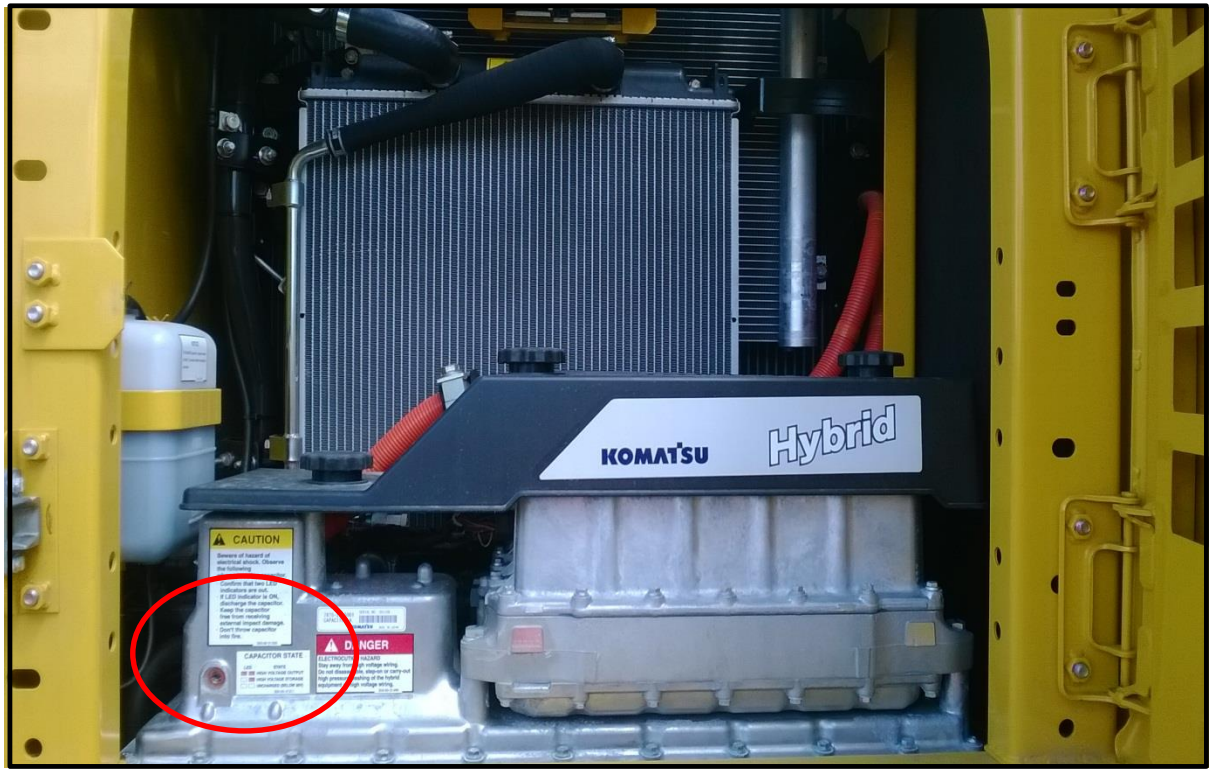
Hybrid Cooling System



Also cools the slew box.

Capacitor State





Fuel Water Separator and Fuel Tank Drain (RH Rear Door)

Checks Before Starting

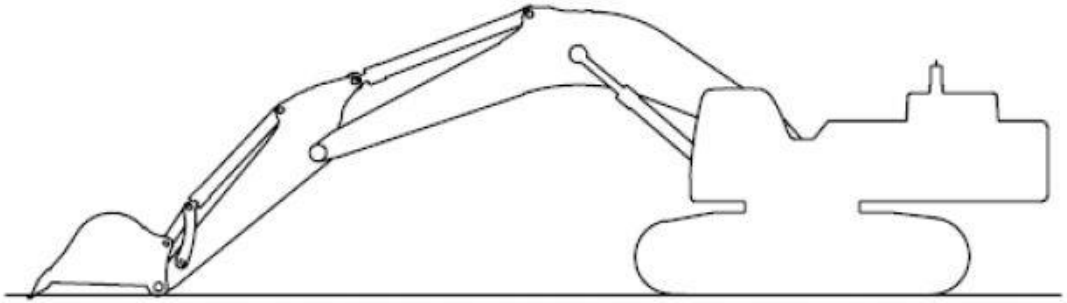
Drain Water And Sediment from Fuel Tank

1. Open the door at the right of the machine.
2. Set a container under drain hose (1) to catch the drained fuel.
3. Turn drain valve (2) to the OPEN (O) position and drain all the sediment and water accumulated at the bottom together with the fuel.
4. When clean fuel comes out, turn drain valve (2) to the CLOSE (S) position.
5. Close the door.

Hydraulic Tank

Right Hand Side Rear Door

Hydraulic fill point



Position for checking Hydraulic Oil

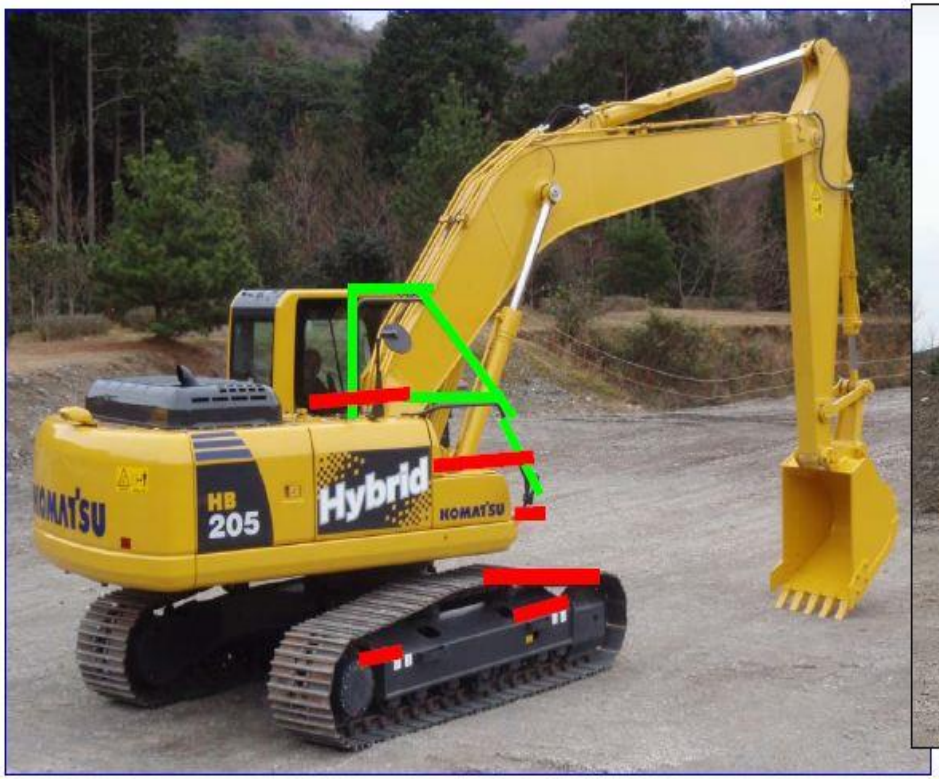
To release hydraulic pressure

Within 15 sec's after stopping engine,

turn start switch to ON position &

operate control levers

Access and Egress



Hand rail / grab
Foot step / plate

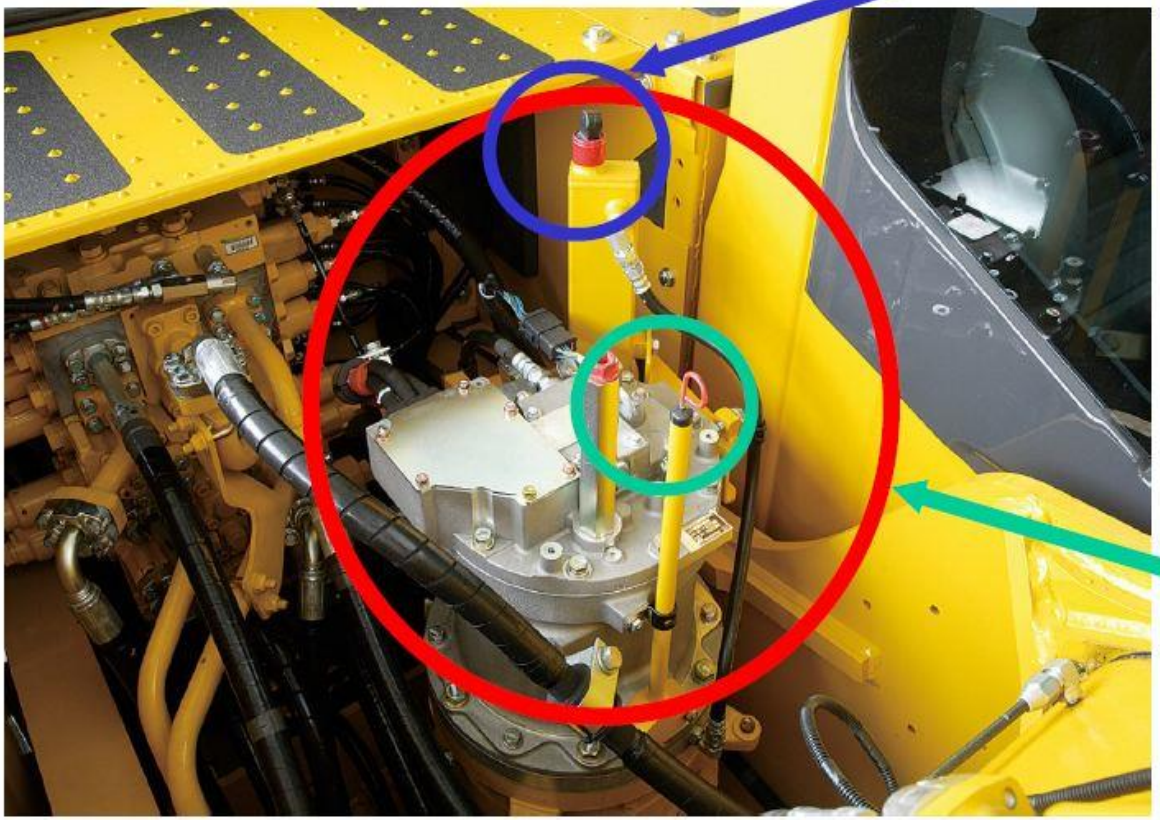
Three Points of Contact

Use steps & handrails
Maintain contact
Keep access clear
Avoid slippery surfaces

DO NOT jump off

Check Oil in Swing Machinery Case

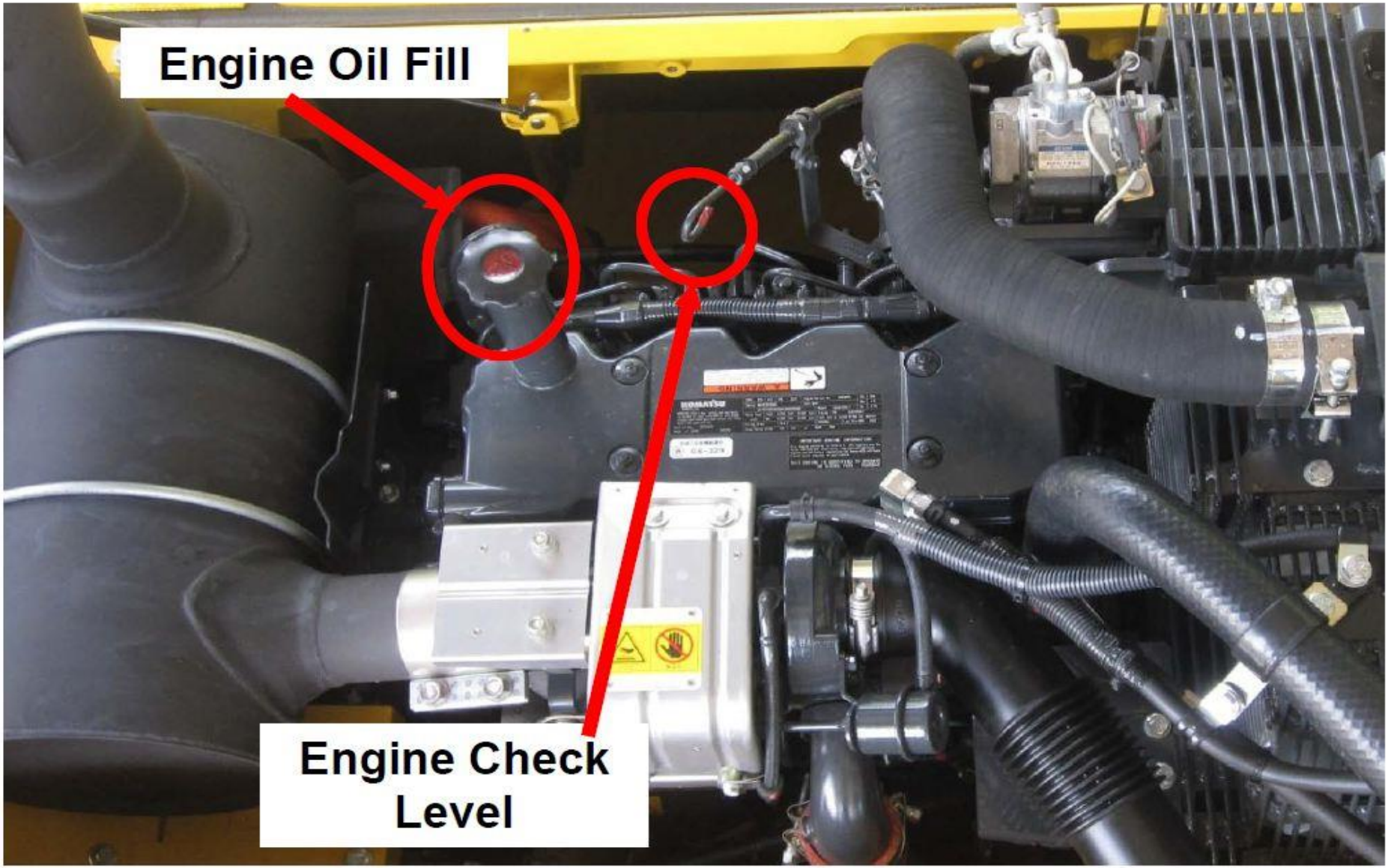
Fill Point



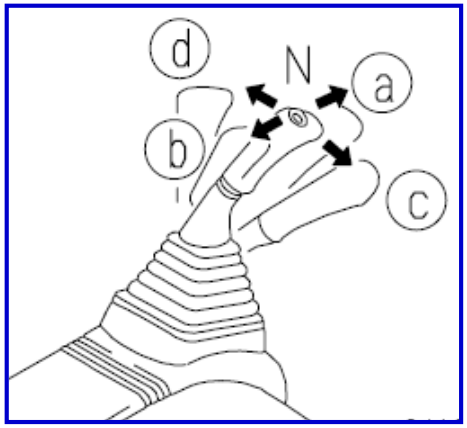
Dip Point

Engine Oil

also check for general abnormalities and leaks

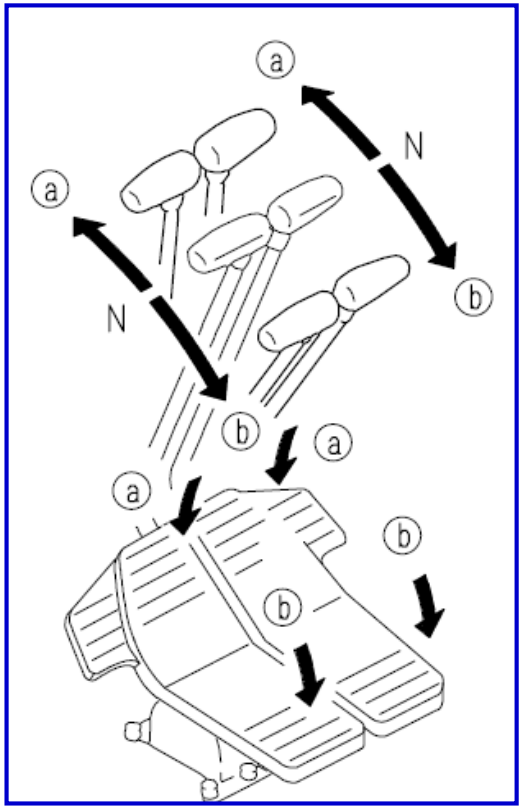


Control levers

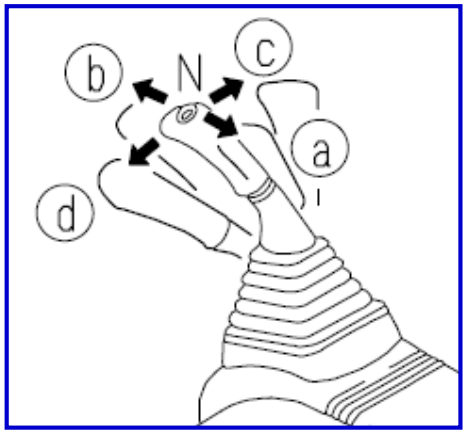


Arm operation
(a) Arm OUT
(b) Arm IN

Swing operation
(c) Swing to right
(d) Swing to left



(a) FORWARD: The lever is pushed forward
(The pedal is angled forward)
(b) REVERSE: The lever is pulled back
(The pedal is angled back)
N (Neutral): The machine stops



Boom operation
(a) RAISE
(b) LOWER

Bucket operation
(c) DUMP
(d) CURL

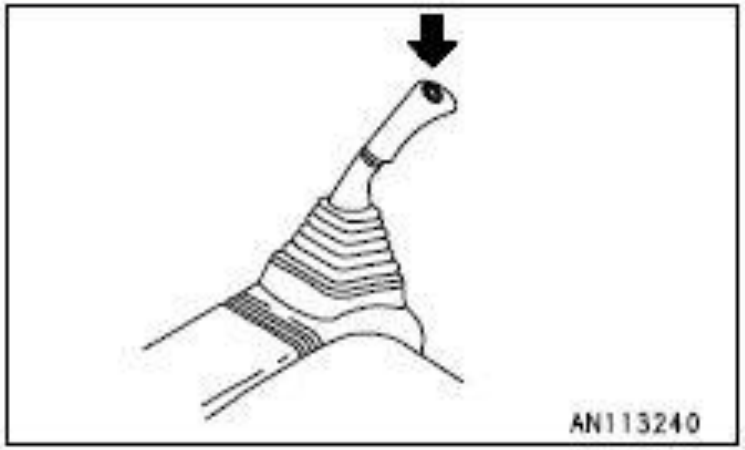
One –Touch Power Max Button

One-Touch Power Max. Switch

The one-touch power max. Switch can be used during operations to increase the power. Make effective use of this function whenever necessary in combination with the working mode.

- Press the left knob switch and keep it pressed. The power is increased as long as the switch is being pressed. However, the increased power is automatically canceled after 8.5 seconds.

- This function is not actuated when the working mode is set to L mode, B mode, or ATT mode.
- This function is not actuated when oil pressure load is low.



Excavator Controls

Main Computer

Work Lights &
Monitor Panel contrast

Swing Safety
Lock

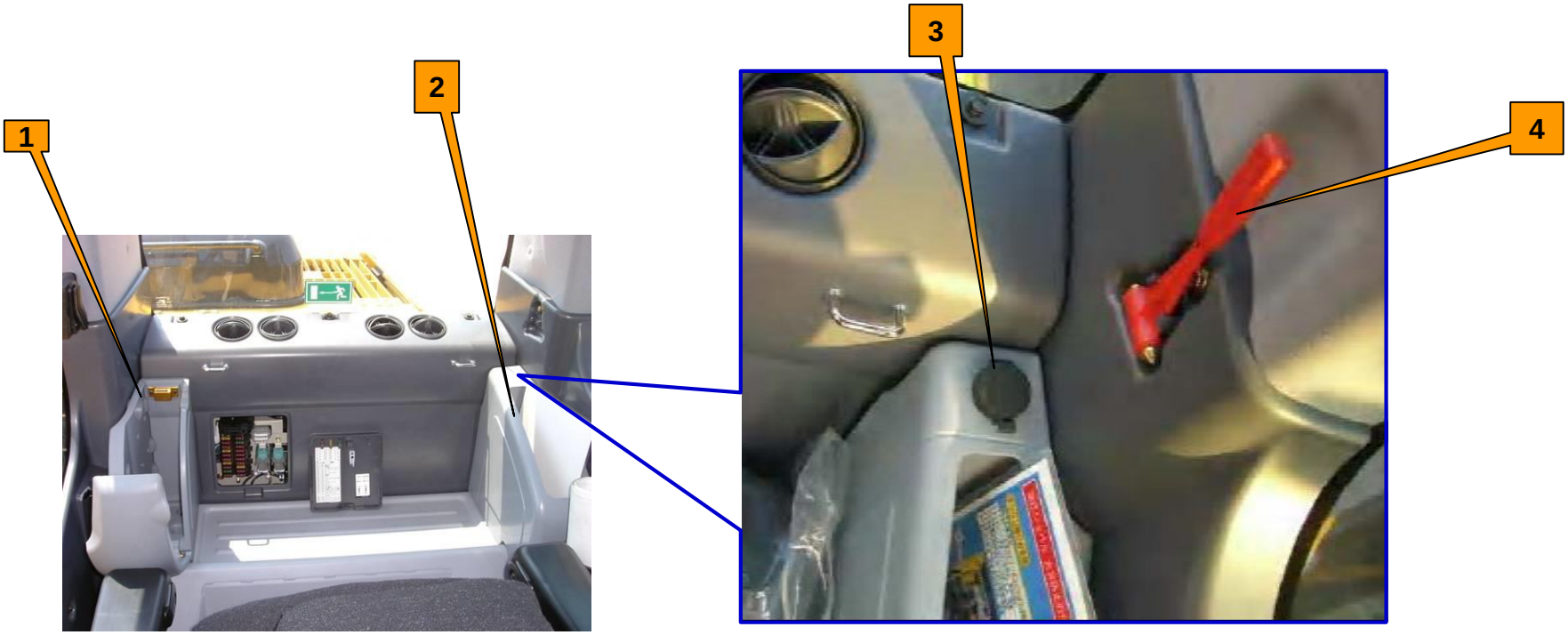
Fuel Control
Dial

Cabin Blower
Switch

Work Lights

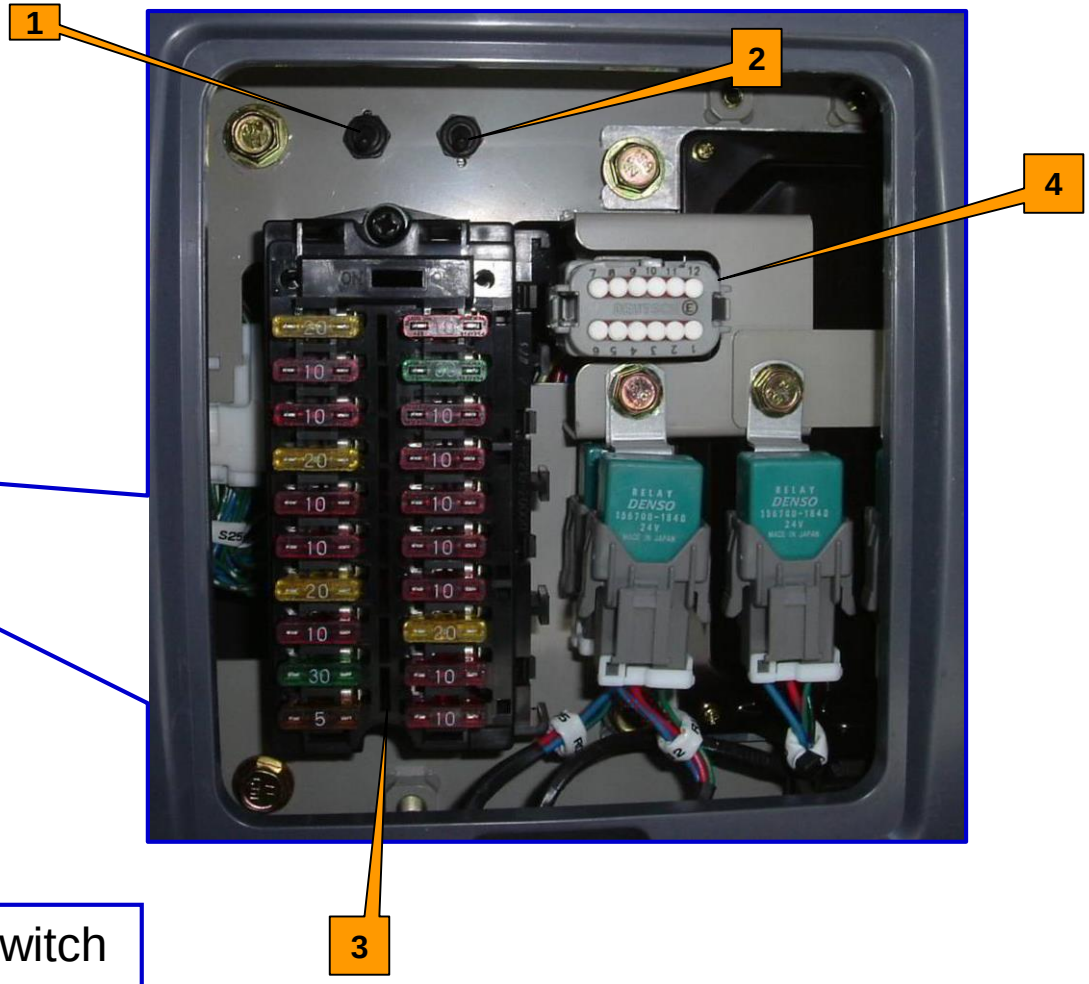
Quick Hitch
Activation Switch

General view of controls & gauges



1. Hot/Cold drink box
2. Magazine box
3. 12 volt power source (If Equipped)
4. Emergency escape hammer

General view of controls & gauges



1. Emergency pump override switch
2. Swing Brake release switch
3. Fuse box
4. PC Connection

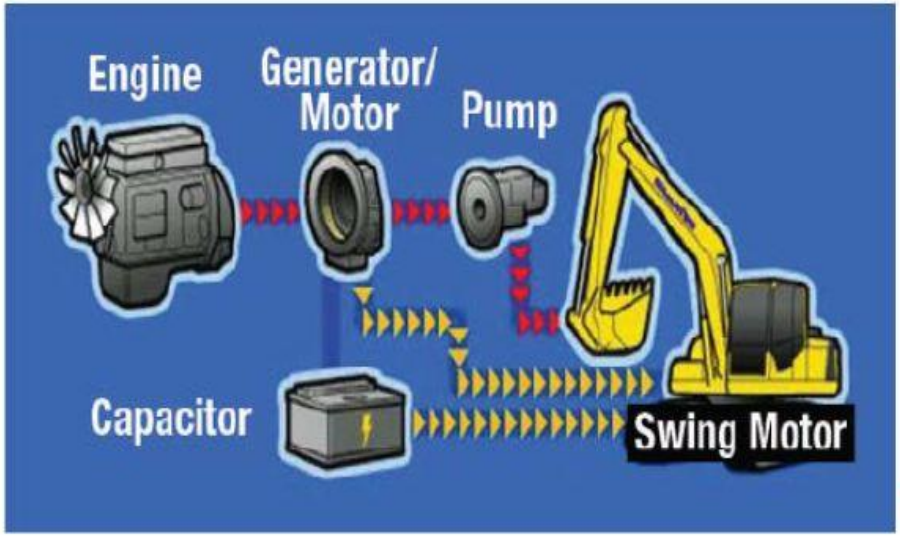
Checks before starting

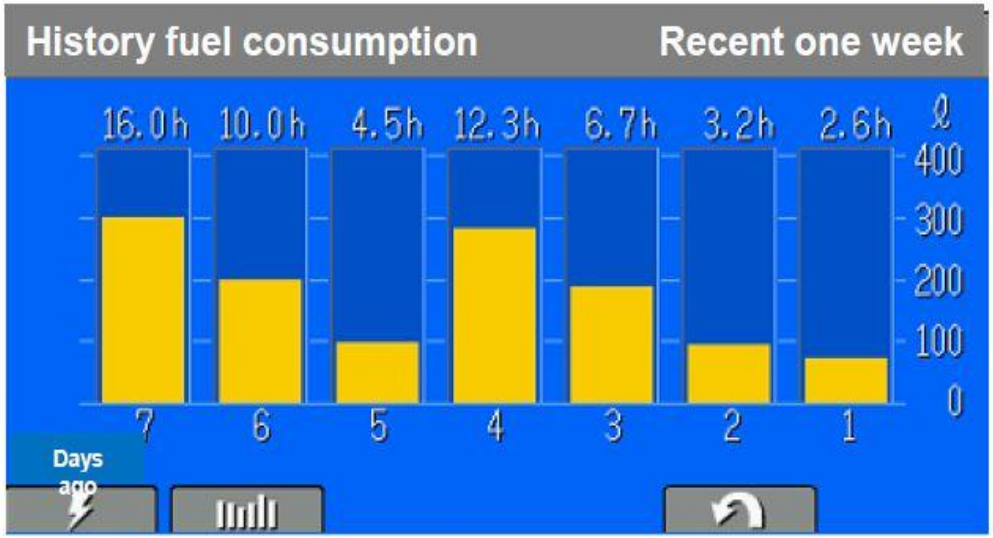
- Walk-around
- Check for evidence of greasing
- Check attachment security
- Check underneath machine and hoses for leaks and damage
- Check for general abnormalities and/or damage with machine
- Check coolant level
- Check engine oil level
- Check Hydraulic Oil
- Check Slew motor level.
- Check fuel level
- Drain sediment from tank daily
- Check monitor panel
- Check wiring
  - batteries,
  - starter motor,
  - alternator
- Check track tension
- Check undercarriage for damage
- Adjust seat & seat belt
- Adjust mirrors
- Hydraulic lock is engaged

Swing Emergency Stop Switch

- In emergencies press the swing emergency stop switch to stop the swing.
- The swing stop switch should only be used when it is impossible to stop the upper structure from swinging without any levers being operated.
- If the emergency stop switch was activated during swing, damage to the swing brake may occur, please contact a Komatsu distributor to carry out an inspection or repair.

F2 – Fuel consumption monitor screen/energy monitor screen





General view of controls & gauges

Function Switches

Work mode Switches

Air-con Switches

General view of controls & gauges

1. Engine coolant temperature monitor
2. Engine coolant temperature gauge
3. Hydraulic oil temperature gauge
4. Hydraulic oil temperature monitor
5. Service meter/clock
6. Hybrid temperature gauge
7. Auto deceleration monitor

8. Work mode monitor
9. Travel speed monitor
10. Fuel gauge
11. ECO gauge
12. Fuel level monitor
13. Fuel consumption monitor
14. Hybrid temperature monitor

General view of controls & gauges

F3 – Camera Screen selector mode

General view of controls & gauges

F4 – Service Meter/Clock display selector switch

General view of controls & gauges

F5 – Maintenance selector switch

General view of controls & gauges

F6 – Maintenance selector switch

General view of controls & gauges

Work mode Switches

1. Auto deceleration switch
2. Working mode selector switch
3. Travel speed selector switch
4. Buzzer cancel switch
5. Wiper switch
6. Window washer switch

General view of controls & gauges

Air conditioning Switches

7.Fan Speed switches
8.Temperature control switches
9.Auto switch
10. A/C Switch ON/OFF
11. Fresh/Recirculation air selector switch
12. Vent selector switch
13. OFF switch Air-con system master switch

Checks After Start

- Allow Machine to Warm up for 5 Mins
- Insure Engine Water Temp is in the Green Range
- Check Audible Warning Devices
  - Horn & Travel Buzzer
- Operate Hydraulic through all ranges of motion to Insure Hydraulic oil is at operating Temperature
- Check all lights and Rotating beacon
- Check Steering and Braking when moving off

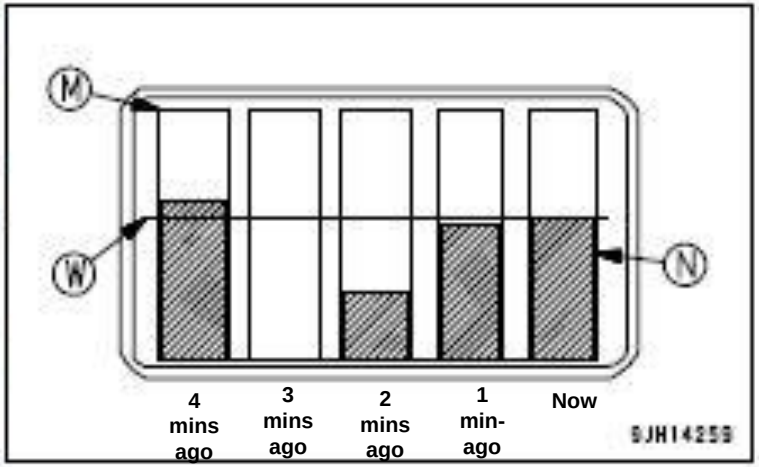
Fuel Consumption Monitor

Hybrid

FUEL CONSUMPTION MONITOR

This gauge (17) displays the average value for the fuel consumption once a minute after the starting switch has been turned to ON position.

- Bar (N) on the right side of the gauge shows the most recent value. The bars on the left of this bar show the old values for each previous minute.
- The orange graph shows the situation when the gauge reaches the highest point (M); the value here is 30 liters /h. The white line (W) in the middle is a guideline showing 18 liters/h.
- Each time the starting switch is turned from OFF to ON, the graph is deleted.



ECO Gauge

ECO GAUGE

This gauge (15) shows the instantaneous fuel consumption.

The instantaneous fuel consumption means the fuel consumption rate at each current moment, which varies with the work load and engine speed.

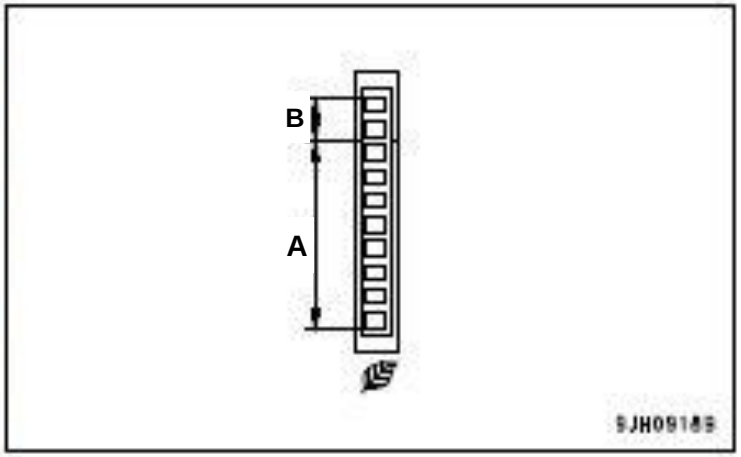
When the gauge is in green range A, the instantaneous fuel consumption is at a good to medium level.

When the gauge is in yellow range B, the instantaneous fuel consumption is at a bad level.

- When the gauge enters the yellow range, there is no abnormality on the machine, but to protect the environment, reduce

  the engine output to a point where there is no adverse effect on the operation. Generally, perform energy-saving operations in the green range.

  Reducing the frequency of travel also helps to save energy. Consider the best way of saving energy.



Fuel Consumption Gauge

FUEL CONSUMPTION GAUGE

This monitor (16) indicates average fuel consumption of the machine.

(A): Displays the average fuel consumption of a day (from 0:00 a.m. of the day to 0:00 a.m. of the next day).

(B): Displays the split fuel consumption under measurement.

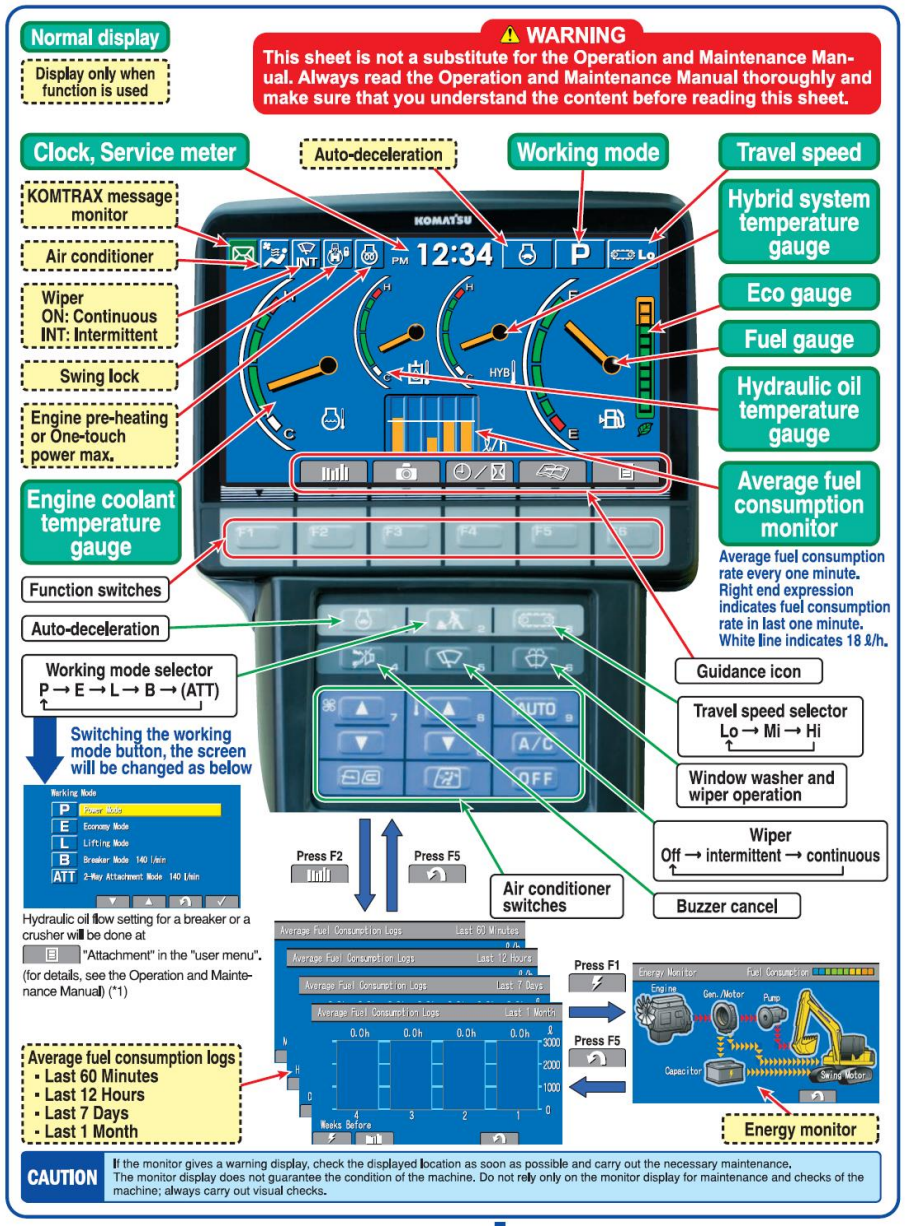
(C): Indicates the split fuel consumption measurement is stopped.

REMARK

Display on the fuel consumption gauge can be switched between the average fuel consumption per day and the average fuel consumption during an selected period (split fuel consumption).

For the display change procedure, see "ECO GUIDANCE (PAGE 3-53)".

HB205-1 Monitor panel Handy manual



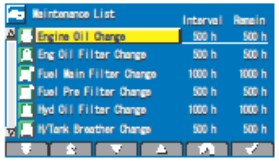
Working mode		Content
P	Power mode	Settig of high-efficiency and powerful operation
E	Economy mode	Settig of low-cost operation with less fuel consumption
L	Lifting mode	Setting of optimum work equipment speed
B	Breaker mode with attachment piping	Setting of optimum flow rate pre-determined (See *1 in the front page)
ATT	Attachment mode with attachment piping	Setting of optimum flow rate pre-determined (See *1 in the front page)

Indicator			
	There is unread messege (green)		Pre-heating
	There is messege need to reply (blue)		One-touch Power max
	Air conditioner		Auto-deceleration
INT	Intermittent wiper	Lo	Travel Low speed
ON	Continuous wiper	MI	Travel Mid speed
	Swing lock	HI	Travel Hi speed

Guidance icon	
	Switching to video screen
	Switching clock and service meter
	Maintenance mode
	User mode
	Move to next page
	Move to previous page
	Move to next item
	Move to previous item
	Back
	Confirmation
	Switching to average fuel consumption logs
	Switching to energy monitor

If or display appears on the screen, the maintenance time for some item is close.

Press (F5) switch



Yellow → Maintenance time is close

Red → Time for maintenance

KOMATSU

If a caution display is given, contact your Komatsu distributor.

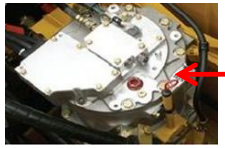
Caution (Warning)	
	Engine coolant temperature overheated
	Hydraulic oil temperature overheated
	Abnormal drop in coolant level
	Insufficient battery charge
	Clogged air cleaner
	Abnormal drop in engine oil pressure
	Abnormal drop in engine oil level
	Water separator filled
HYB	Abnormality of hybrid system
HYB	Hybrid system temperature overheated
	Swing emergency stop

Symbol	Maintenance item	Standard replacement interval
	Change engine oil	500h
	Replace engine oil filter	500h
	Replace fuel main filter	1000h
	Replace fuel pre-filter	500h
	Replace hydraulic oil filter	1000h
	Replace hydraulic tank breather element	500h
	Replace final drive case oil	2000h
	Change swing machinery case oil	1000h
	Change oil in hydraulic tank	5000h
HYB	Change generator motor oil and clean oil filter	1000h
HYB	Change electric swing motor oil	1000h

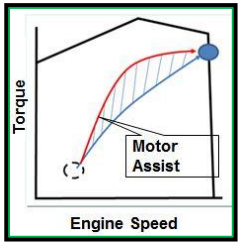
Some things that are different with Hybrid

Engine RPM goes up & down when I'm not working the machine ?
Normal, when the hybrid storage drops the engine/generator just pumps it up again.

When I slew! the engine doesn't rev up to give me power ?
The slew power is held in the capacitor & given on demand.



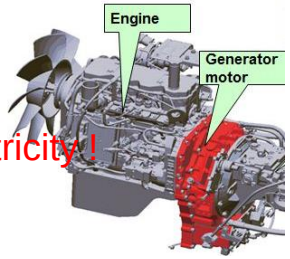
The engine is only 4 cylinder, will it have enough power ?
The engine has an additional electric motor which assists the diesel engine, giving instate torque when required.



How does the Hybrid store the power, so I can have it when I need it?
The engine/generator makes AC power ,the invertor changes it to DC {so it can be stored} in the capacitor. When it's needed it's changed back to AC & used for the slew & to support the diesel engine giving high torque when needed.

The slew makes a funny noise when I use it ! Is this normal ?
Yes. It's an electric motor ,so it's NOT what we are use to, great for walking & slewing/ mulching using the engine power for the hydraulics & the slew taken care of with electrical power.

Is it a true Hybrid / and what does hybrid mean !
Yes .It has two different types of power ..Diesel / engine {with electric assist } & stored electricity !



Hybrid Excavator: Checklist for Additional Explanations at Delivery

Date of Explanation (DD/MM/YYYY): _____

Customer information

Company Name : _____

Customer Name : _____

Model _____ serial # _____

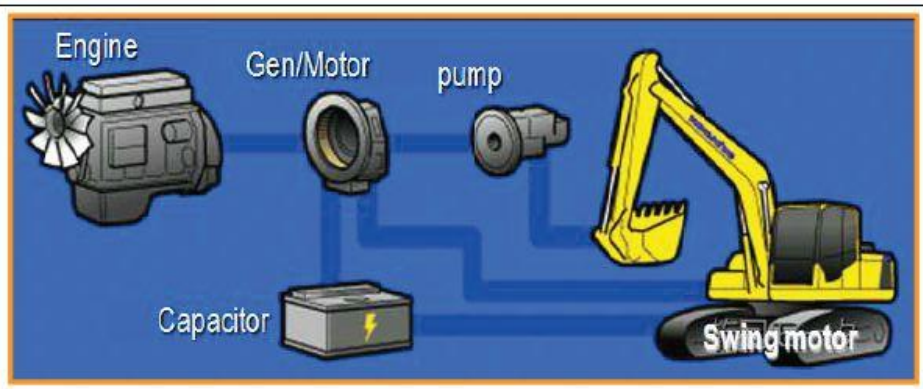
Distributor information:

Distributor Name : _____

Instructor Name : _____

* Check the box after explaining each item.

Explanation of Hybrid COMPONENTS	Check
Swing electric motor	
Equipped an electrically driven swing motor instead of a conventional hydraulic motor.	
The swing motor regenerate the braking energy and sends it to the inverter for storage in the capacitor.	
Generator motor	
The motor is driven by the engine, provides generated energy to the swing electric motor and charges the capacitor as a generator.	
Assisting acceleration of the engine RPM as a motor.	
Inverter (included Hybrid controller)	
The Inverter controls the Hybrid system. Functions are converting AC and DC current between capacitor and motors, changing electric current frequency, boosting electric voltage.	
The inverter controls the motor's rotating and generating power and capacitor storage.	
Capacitor	
The capacitor is an electrical energy storage, can store and release energy very fast.	
Power Cables	
The cables are for connecting high voltage electric components. The cables colored by bright orange.	



Explanation of Hybrid FEATURES	Check
Engine RPM Change (Operation)	
Engine rpm is determined by the amount of load on operation (between 1250 rpm and 2000 rpm). it is an unique operating feeling.	
Low engine RPM control (Decel)	
When control levers are in the neutral position, the engine speed decreases to the waiting rpm (1250 rpm) immediately. After 4 seconds, the engine's idle rpm is set lower at 700rpm (when auto-decel is on) to reduce fuel consumption. When Capacitor is required charging, engine becomes 1050rpm for charging.	
Swing motor rotation Sound	
The swing electric motor turns faster than the hydraulic swing motor. Then there is the additional reducing gears to swinging same speed. It leads a unique sound when swinging and braking.	
Capacitor Charging Sound	
Some high-frequency sounds may be heard right after engine start up and during idle. It is the sounds of the capacitor being charged.	
Warm-up Operation	
The cab heater may take additional time to provide warm air. This is due to the low engine rpm control. Auto-warming will still raise engine RPM, if coolant is below 30°C(86°F)	

Form No. xxxxxx

Safety Instructions	Check
Hybrid components are isolated from the chassis. Under normal conditions, touching the component housings will not cause electrical shocks. If the components has any failure, do not touch the components. It may cause serious injury.	
In the event of any Hybrid component failure, the Hybrid system will automatically shut itself down. The monitor will display an E09 error code to contact Komatsu Distributor for service. Hydraulics will still move normally.	
If a Hybrid component has a damage or is submerged (in any liquid), stop the engine immediately.	
If any of swing problems below occur, activate the "swing emergency stop switch" (Red color button) to stop swing. **1. Swing does not stop even when control levers are returned to neutral position.** **2. Swing starts even when control levers are not being operated.** Never use the swing emergency stop switch during normal operation. It cause premature wear of the swing brake.	
If any event of hybrid components described above occurs, stop the engine immediately and contact Komatsu distributor. Never touch any of the hybrid components.	

Cautions	Check
Be sure to follow the Operations Manual to operate the "Swing Parking Brake Release Switch".	
Do not step on Hybrid components or high-voltage wiring.	
Make sure that water does not contact hybrid components, wirings and connector directly. If water gets into the components, damage on components or serious personal injury may be caused.	

Explanation of HYBRID Machine Operation (Difference with STD / Operate with the customer for 7 to 8 minutes.)	Check
Boom raising operations (From 700rpm and 1250rpm)	
90-degree rotation operation (Sound of swing motor, Feeling of the beginning and ending of the movement)	
Wiggle of the arm (Skeleton bucket operation: 2 times per second) (Changes in the engine rpm)	
Combined operations (Surface finishing with arm + boom) (Changes in the engine rpm)	
Demonstrate operation of the "Swing Parking Brake Release Switch" and manual rotation of the upper structure. Be sure to demo this on flat level ground.	

Customer Comments

Let the customer operate the excavator "solo" for 20 to 30 minutes
Then interview to evaluate their understanding level, and obtain feedback, request an initial opinion (for the unique operational feeling, difference with STD etc.).

Understanding Level:
Opinion, Evaluation:
Request:

Welcome to the future.

End of Hybrid Training