# OPERATORS MANUAL

## Starke EcoMaxx Series

## ECO-FD 40-100

Rev 11/2016


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STARKE
ECOMAXX

# FOREWORD

The forklift adopt the latest system of wide-view mast, hydraulic transmission, automatic pressure-increasing brake etc. and has the high quality engine and instruments to go with it. So it has the advantages of high performance, convenient operation, wide visibility, flexible steering system, reliable brake system, powerful engine, low noise, environment-friendly emission and cool exterior.

The brochure has the brief introduction of the 5-10T internal combustion counterbalanced forklift, including parameter, structure of main components, working theory, operation and maintance. In order to help driver understand the forklift better and get the utmost out of it, please read this brochure carefully before the operation.

Please strictly comply the regulations and notices in the brochure, aboratively operate the forklift and get the utmost out of it.

We reserve the right to make any changes in the specifications without prior notice.

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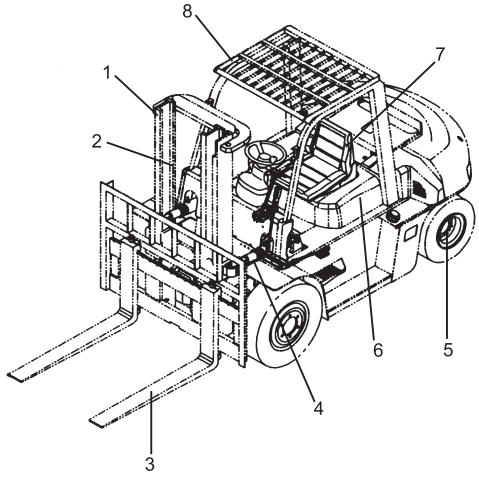
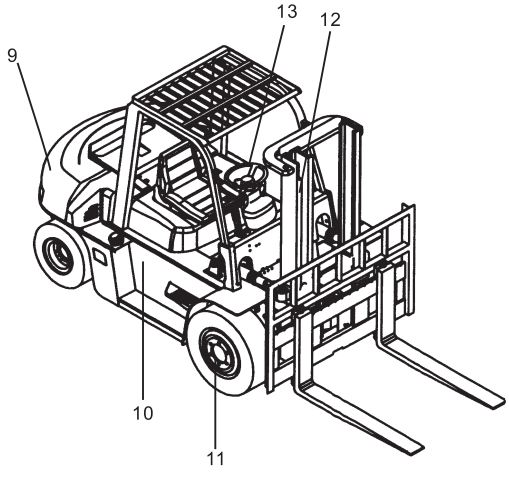
# Ⅰ. Forklift components description and warning marks

**MAIN COMPONENTS**

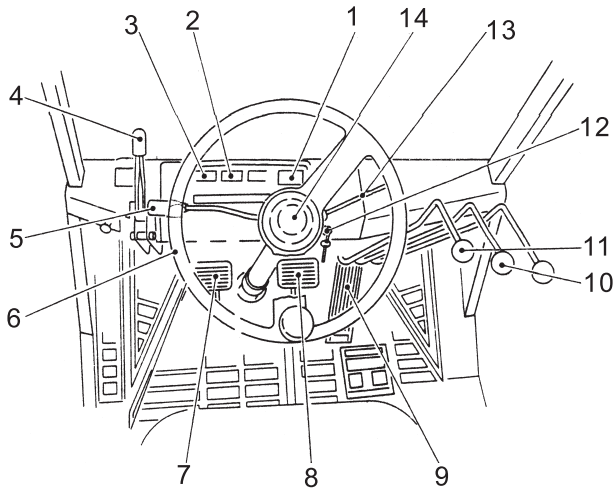



1.Mast
2.Chain
3.Fork
4.Tilt cylinder
5.Rear axle
6.Engine hood
7.Oprator's seat
8.Head guard




9.Counter weight
10.Frame
11.Drive axle
12.Lift cylinder
13.Steering wheel

## DRIVING CONTROLS AND INSTRUMENT PANEL




1.Hour Meter
2.Coolant Temp Gauge
3.Fuel Gauge Horn button
4.Parking brake lever
5.Forward-reverse lever
6.Steering wheel
7.Inching Pedal
8.Brake pedal
9.Accelerator pedal
10.Tilt lever
11.Lift lever
12.Ignition switch
13.Light control and turn signal switch
14.Horn Button


(1)START

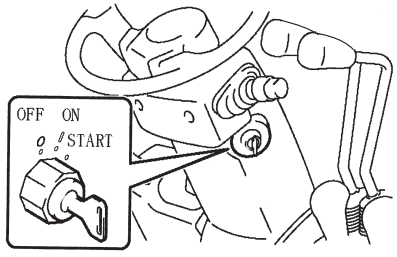
**Check method of each warning lamp**

Please check if all warning lamps come on when the ignition switch is set ON.

**Note:**

Use the light control switch to check the meter lighting lamp.

## SWITCHES AND LEVERS




**Ignition switch**

(OFF)⋯⋯ Engine stop position. Key insertion and withdrawal are performed in this position.

(ON) ⋯⋯ Engine operation position . Located one position clockwise form (OFF) position . The intake heater is preheated before starting in the diesel model .

START⋯⋯Engine, start position . Located one position clockwise from the (ON ) position .

After engine starting , release the key and it will return to the (ON) position automatically .

In the torque converter model , the engine does not start unless the control lever is in the neutral position .

**⚠Caution**

. Never operate the ignition switch without firstly sitting on the seat .Otherwise , the forklift could start to move uncontrolled , causing an accident .

. Do not leave the switch in the (ON) position when the engine is stopped . It may cause over discharge of the battery .

. Do not turn the switch to the START position while the engine is running .

. For the sake of safety it is recommended to always start the engine of a vehicle with the transmission gear shift lever shifted in the neutral position .

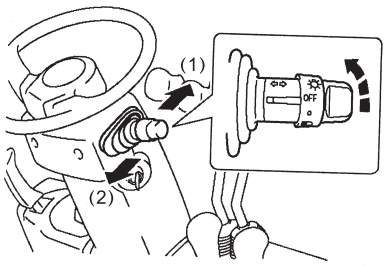
. Do not operate the starter motor for more than 30 seconds continuously . Return the switch to the (OFF) position and wait at least 30 seconds prior to attempt restarting .

**⚠Caution**

. In case of the anti-restart ignition switch (optionally available) , be sure to shift the switch to the (OFF) position before attempting to start the engine again .

. When the ignition switch OFF (engine off ) , the fork will not move down even if the lift lever is so operated . However , if you sit in the seat and turn on the ignition switch , you can lower the fork . Do not operate the lift lever before getting on the vehicle and starting the engine . (key off lift lock )

. If the diagnosis lamp does not go off even when the operator sits on the seats , the battery power may be low . In such a case , do not drive the vehicle until the lamp goes off , otherwise the vehicle may not be operated properly . If you are obliged to drive the vehicle , do so with utmost care . Also , stop driving and ask a Good Sense dealer for inspection if the lamp does not go off 1-2 minutes after the engine starting , or when you race the engine for a while . (For diesel vehicles, the diagnosis lamp may be lighted for a while to warm up the engine after cold starting . This is , however , not engine trouble or failure. )




(1) Left turn

(2) Right turn

**Integrated light and turn signal switch**

This switch serves as both two-position light control and turn signal switch .

**Light control switch**

Irrespective of a key switch position , this switch allows you to turn on and off lighting .This switch has two positions. With the switch at each position , the lamp comes on as shown below.

| Lamp name | Step 1 | Step 2 |
|---|---|---|
| Head lamps | - | ○ |
| Side clearance lamps, tail lamps | ○ | ○ |
| Meter illumination lamp | ○ | ○ |

**⚠Caution**

Do not keep lamps , such as head lamps , on for a long time when the engine is stopped . It may cause over discharge of the battery to make engine starting impossible .

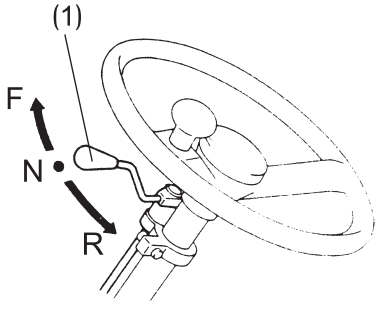
**Turn signal switch (Option)**

Make the turn signal lamps blink

**Left turn** ·····Push forward

**Right turn** ·····Pull backward

The signal switch will be operated when the ignition switch is ON .




(1) Forward-reverse lever

**Forward-reverse lever**

Lever for shifting between forward and reverse .

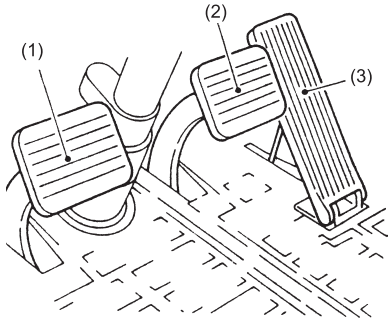
Forward Ⅰ、Ⅱ·····Push the lever forward(F)

Reverse Ⅰ、Ⅱ·····Pull the lever backward®

The neutral position(N) is halfway between the forward and reverse positions .

⚠Caution

The engine cannot be started unless the shift lever is at the neutral position .Stop the vehicle before shifting between forward and reverse .




**Inching Pedal(1)**

As the inching pedal is pressed, the oil pressure in the hydraulic clutch drops accordingly allowing the operator to perform inching operation. Use this pedal to inch the truck while operating the hoist system at a high speed.

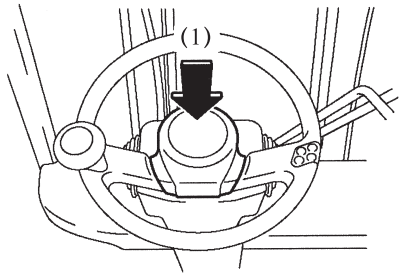
When pressed to the full, this inching pedal serves as a brake pedal.

**Accelerator Pedal(3)**

The accelerator pedal increases the engine speed. With this pedal released, the engine runs at idle rpm.

**Brake Pedal(2)**

Press this brake pedal to slow or stop the truck. At the same time, the brake lights come on.

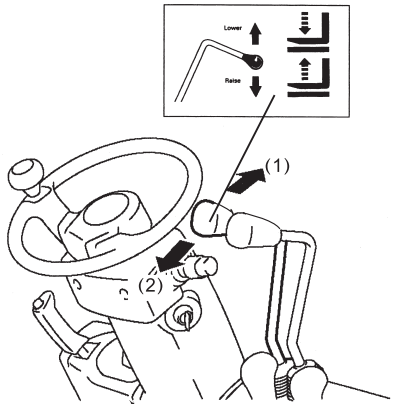



(1) Push

**Horn button**

Press the button in the center of the steering wheel to sound the horn .

The horn will sound even when the ignition switches off .




(1) Lower
(2) Raise

**Lift lever**

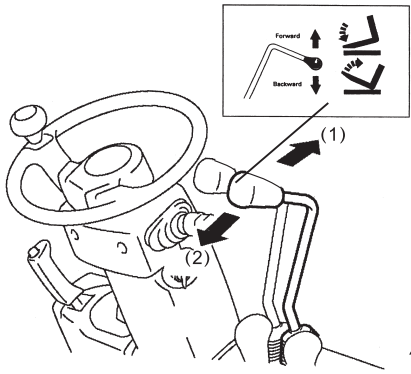
Raise and lower the forks .

**Raise**·····Pull backward

**Lower**·····Push forward

The lifting speed can be adjusted by the degrees of accelerator pedal depression and lever operating stroke .

The lowering speed can be adjusted only by the degree of lever operating stroke .




(1)Forward tilting
(2)Backward tilting

**Tilt lever**

Tilt the mast forward and backward .

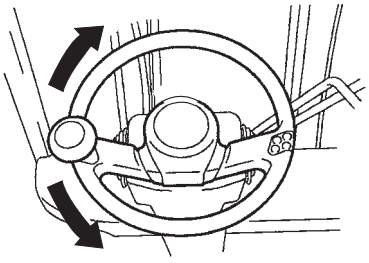
**Forward**·····Push forward

**Backward**·····Pull backward

The forward , backward or tilting speed can be adjusted by the degrees of accelerator pedal depression and lever operating stroke .

**⚠Caution**

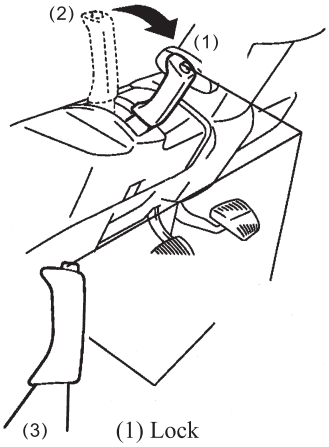
. Always operate the tilt lever from a seated position .



**Steering wheel and round handle**

The steering wheel controls the direction of turning left or right .

. Use your left hand to operate the round handle .




(1) Lock
(2) Release
(3)Grip

**Parking brake lever**

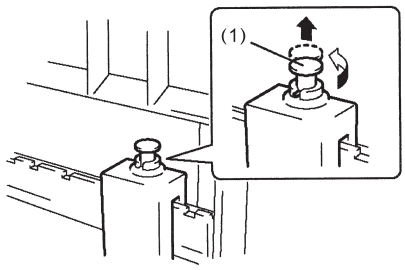
When parking , grasp the grip of the lever and fully pull it towards you . When releasing , grasp the grip of the lever and then push it back . while operating the parking brake lever , keep the brake pedal fully depressed .

**⚠Caution**

. Never hold the lever at other than the grip because a finger may be pinched . when releasing the parking brake by holding the lever for starting on a slope , for example, hold the grip at above the protrusion .

. When parking on a slope , apply wheel chocks to the wheels .

. Traveling without releasing the brake will spoil the brake performance .




(1) Fork stopper

**Forks**

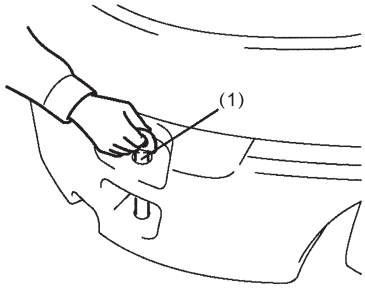
Lift each fork stopper and turn to release so that forks can be shifted left and right .

Adjust the forks in the position most appropriate for the load .

When adjusting the forks , make sure that the center of gravity of the load corresponds to the center of the vehicle . After adjustment , turn the stoppers to lock the forks in place .

**⚠Warning**

Make the forks are locked before carrying a load .




(1) Draw bar

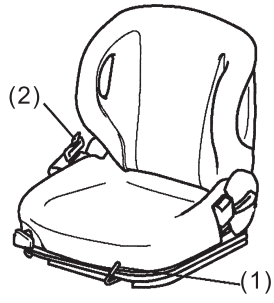
**Draw bar**

The draw bar is located at the back of the counterweight, and is used to pull the vehicle when its tires drop into a gutter or become stuck in mud .

It can also be used for loading the forklift onto a truck or another vehicle .

**⚠Caution**

The draw bar should not be used for towing the forklift or for towing another vehicle using the forklift .




(1) Seat slide lever
(2) Seat belt

**Operator's seat**

The operator's seat and seat belt are provided for your safety .The seat can be moved back and forth for position adjustment while the adjust lever is pulled upward .

**Suspension seat**

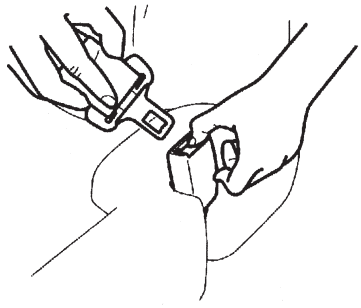
The seat suspension mechanism provides a comfortable seating position according to the weight of the driver . The optimum driving position can be set by using the knob and levers . Elastic seat can reduce the vibration of running forklift .

**Seat slide lever**

Pull slide lever to left , to adjust the back-and-forth position of the seat . The seat is secured in position when you release the lever .

**⚠Caution**

After adjustment , lightly shake the seat forward and backward to confirm that the seat is firmly locked in position .



**Seat belt**

To fasten your seat belt , pull it out of the retractor and insert the tab into the buckle . You will hear a click when the tab locks into the buckle . Pull on the belt to make sure the buckle is securely latched .The seat belt length can be automatically adjusted to your size .

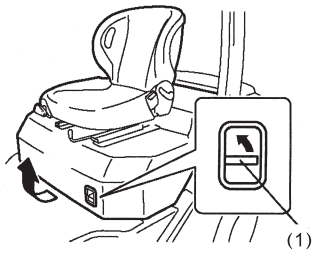
Disconnecting method

Push the release button and allow the belt to retract .

**⚠Warning**

. Buckle up . Your seat and seat belt can reduce the risk of serious injury or death in case of a truck tip over . Your chances for avoiding serious injury or death in a tip over are better if you stay with the truck in the operator's compartment.

. Always wear your seat belt when driving the truck . Trucks can be tipped over if operated improperly . To protect operators from the risk of serious injury or death in the event of a tip over , it is best to be held securely in the seat . The seat and seat belt will help to keep you safely within the truck and operator's compartment , in the event of a tip over , don't jump , grip the steering wheel , brace your feet , lean away from the direction of tip over , and stay with the truck .Please always buckle up your seat belt when driving your truck .



(1) Engine hood lock release lever

**Engine hood**

**Opening**

1. Pulling up the engine hood lock release lever will release the engine hood lock , and the engine hood will pop up slightly .
2. Lift the engine hood .
3. Keep the engine hood open , then shake the hood slightly to check that the gas spring has been securely fastened before letting go .

**Closing**

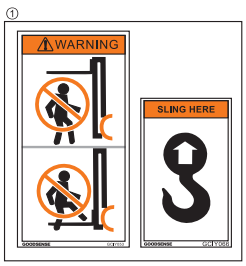
Close the engine hood quietly , and press down the hood until you hear a click sound .

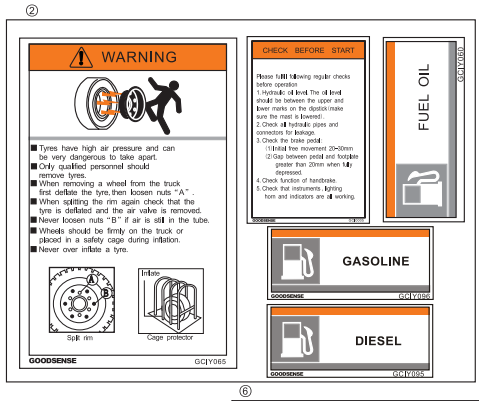
**⚠Caution**

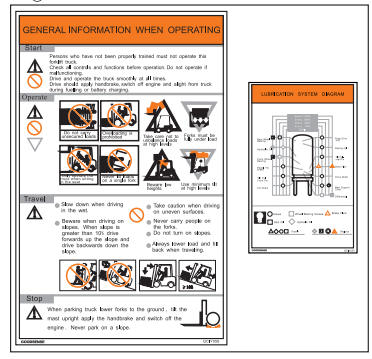
Operating the vehicle without firmly locking of the engine hood is very dangerous . Be sure to check firm locking before operating the vehicle .

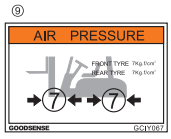
## Warning Marks

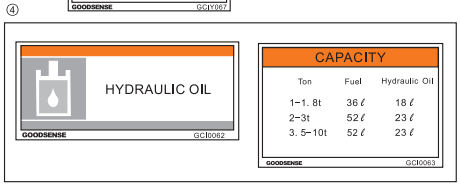
Warning Marks are attached to a vehicle . Before driving it , please be sure to read them carefully .

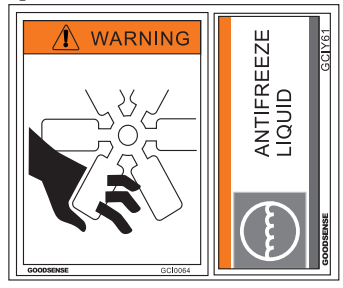


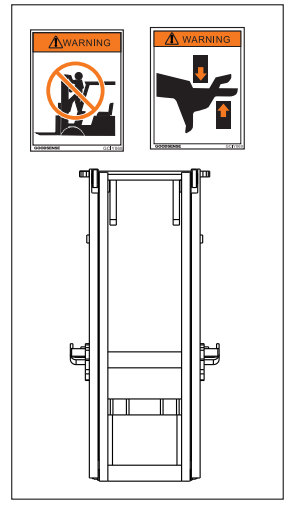



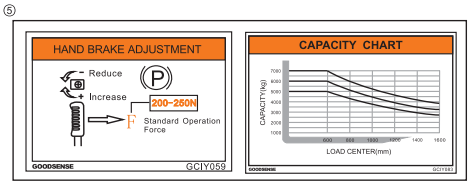



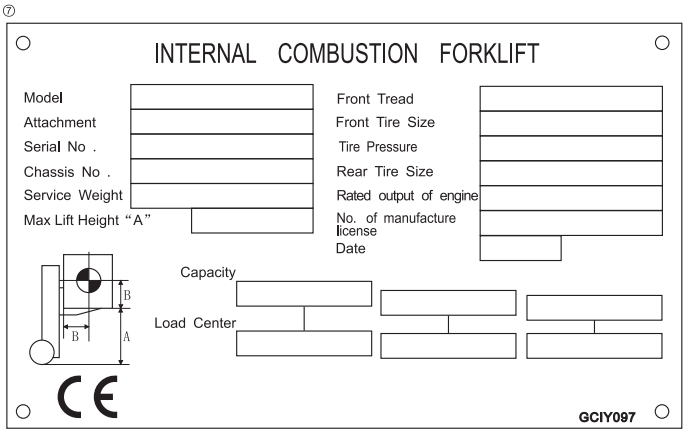



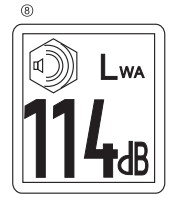



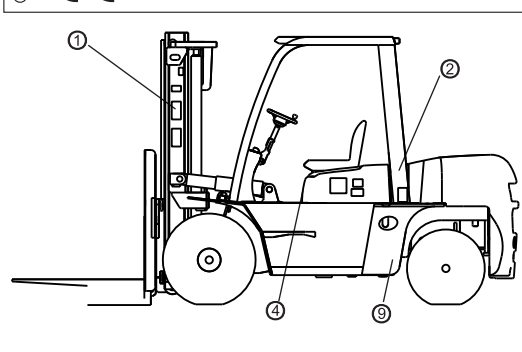



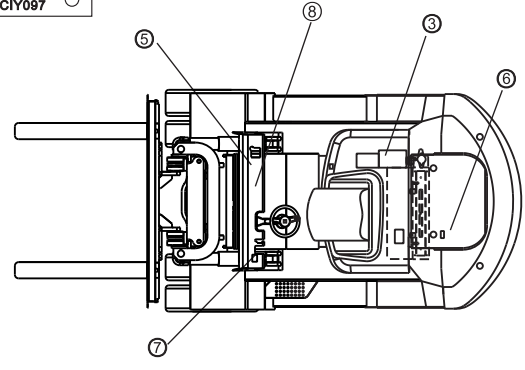



## Ⅱ. Safe Operation Rules and Daily Maintenance for Forklift

The driver and administrator of the forklift must keep "Safety First" in mind and conduct the safe and standard operation according to the ***Instruction book of utility and maintenance*** and ***The Driver manual***.

### 1. Transportation of forklift

Pay attention to the followings when carrying the forklift to the container or the car:

(1) Brake the brake level.

(2) Fix the mast and count weight by steel cable both front and rear, the front and rear tire should be cushioned .

(3) When hanging, according to the instruction of the "anging signal" lift the loads.

### 2. Safekeeping of forklift

(1) No fuel in tank don't let out if the cooling liquid is rustproof and antifreeze liquid.

(2) Apply the rustproof oil to the nonlacquer surface and apply lubrication to the up-and-down roller hinge.

(3) Low the bracket to the lowest level.

(4) Put on the brake shift.

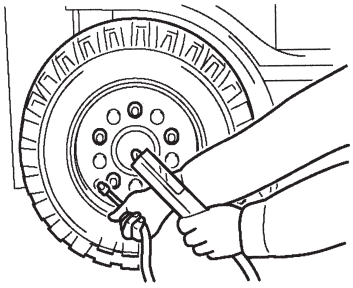
(5) Cushion the forward and backward wheel.

### 3. Pre-oparation check

Pre-operation checks and weekly inspections are the responsibility of the Good Sense industrial vehicle users .

Be sure to perform a pre-operation check before beginning working with ensure safety .

| Item | Inspection |
|---|---|
| Previously detected malfunction | Correct |
| Exterior | Vehicle body , oil leakage , water leakage, loose parts, exterior damage . |
| Wheels | Tire pressure , wear or damage , rims hub nuts. |
| Lamps | Lamp condition , damaged lamps . |
| Hydraulic oil | Oil lever , contamination , consistency . |
| Radiator | Coolant lever , antifreeze requirement . |
| Engine | Oil lever , contamination , consistency , noise , exhaust . |
| Clutch | Engagement , pedal , play . |
| Brake pedal | Pedal play , braking effect . |
| Brake fluid | Fluid level. |
| Parking brake | Operating force , braking effect . |
| Steering wheel | Looseness , play , vibration , veering . |
| Horn | Sound . |
| Instruments | Functioning . |
| Load handling system | Parts , oil leakage , cracking , looseness . |
| Fuel | Amount . |



**(1) Walk around inspection**

**Vehicle uprightness**

Does the vehicle lean to one side or the other ?

If so , check for a tire puncture or a problem of the undercarriage .

**(2) Beneath the vehicle**

Check for any oil or water leakage on the ground or floor where the vehicle is parked .

Check for loose parts or damage .

If any unusual condition is found , have the vehicle inspected with the help of a Good Sense dealer .

**(3) Tire inspection**

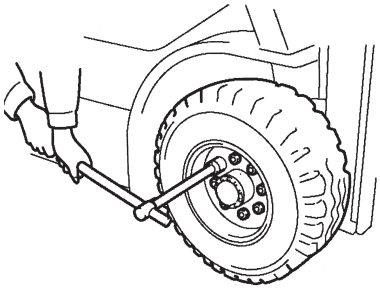
**Tire pressure inspection**

1.Use a tire pressure gauge and measure the inflation pressure . Adjust it to the proper level .

2.After the adjustment , check whether air is leaking from the valve .

**Damage , crack and wear of tires and rims**

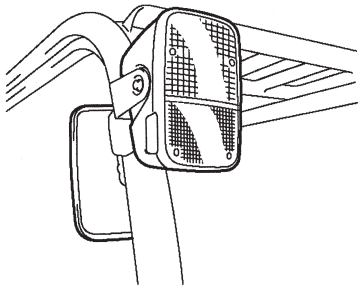
Check the tires for damage and wear , and the rims for bending . If the tires are damaged , or there is a marked difference in the wearing of tires between the front and rear or between the left and right is perceived , or bent rims are found , ask a Good Sense dealer for inspection .



**(4) Hub nut inspection**

Check the tightness of the hub nuts .

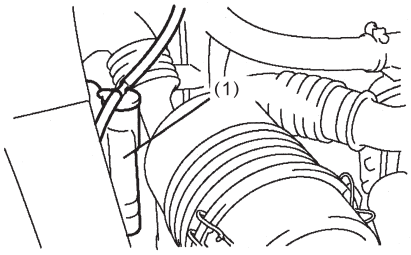
Avoid uneven torque and tighten all of the nuts uniformly .



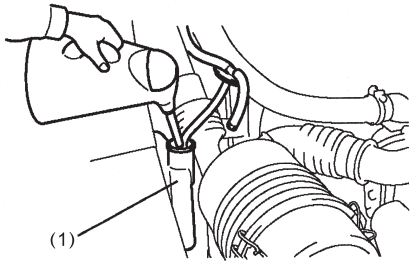
**(5) Lamp inspection**

Are the filaments intact ? Is there any lens damage ?

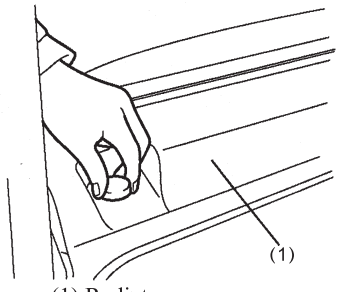
Always keep the lenses clean to ensure proper forward vision .



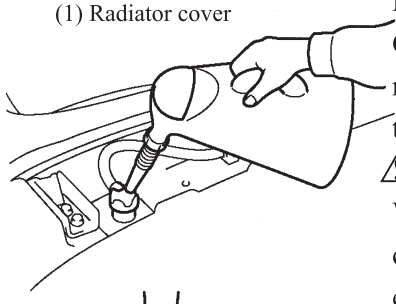
(1) Reservoir tank

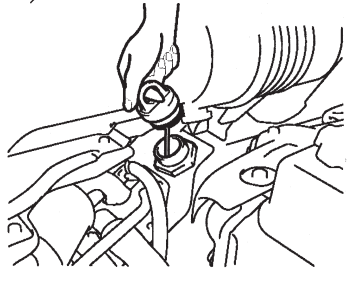


(1) Reservoir tank



(1) Radiator cover





**(6) Engine compartment inspection**

**Engine coolant level check and supply**

Level check and supply of engine coolant shall be performed while the coolant is cool .

1. With the engine off , open the engine hood and check the engine coolant level in the reservoir tank .

**Note :**

The reservoir tank equipment to the radiator automatically supplies the engine coolant when the coolant quantity in the radiator becomes insufficient .

2. Keep the coolant level between the upper and lower limits . If the level is below the lower limit , adjust coolant to the upper limit .

3. The concentration of long life coolant (LLC)in the engine coolant must be 30% (or 50% in a frigid zone .)

**Note :**

If no engine coolant remains in the reservoir tank . Be sure to check the coolant level in the radiator , too .

**(7) Checking the engine coolant level in radiator**

1. Remove the radiator cover .

2. Remove the cap and check the coolant level from the filler port .

3. If the engine coolant is not visible through the filler port , fill appropriately diluted coolant (LLC) into the port .

**Note :**

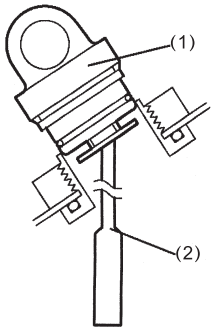
Close and tighten the radiator cap , match the pawl on the reverse side of the cap with the notch on the filler port and turn the cap fully clockwise while applying a downward force .

**⚠Warning**

When the engine is hot , it is very dangerous to remove the cap. Coolant level check must always be performed when the engine is cold .

**(8) Checking hydraulic oil level**

Always stop the engine and lower the fork to the ground before checking the level of the hydraulic oil , while the vehicle is on level ground .Oil pollution level should be limited within twelve degrees.



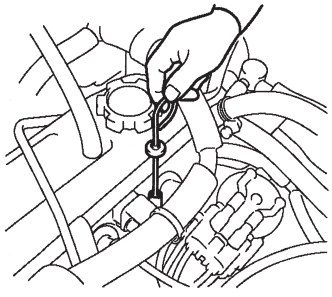

(1) Oil cap
(2) Level identifier

1. Open the engine hood and remove the oil cap .
2. Wipe the level gauge attached to the oil cap with clean cloth, and insert it again into the tank .

**Note :**

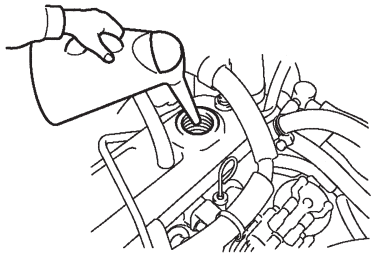
Inspect the oil level by placing the level gauge on the opening of the oil supply inlet without pushing the oil cap in .

3. Extract the level gauge gently and check if the oil adhesion is up to the level line .
4. If the oil level is insufficient , add oil . Spilled and splashed oil must be wiped off thoroughly . Adjust the oil level so that it will fall within a range of 0 thru +10mm from the lift-high mark on the gauge as illustrated on the left side .



**(9) Engine oil inspection**

1. Park the vehicle on a flat ground . If the vehicle is inclined , the indicated level may be incorrect .
2. The oil level must be checked before starting the engine or at least 3 minutes after the engine is stopped .
3. Extract the oil level gauge and wipe it with clean cloth . Insert it again and check if the oil level is between the F and L levels .
4. If the oil level is below the L line , add oil up to the F line .



**(10) Adding engine oil**

1. To supply oil , remove the filler cap and pour oil through the filler port . Never let the oil level exceed the F line .
2. The oil supplied must be appropriate for the season .

SAE40 Ambient temperature higher than 30°C
SAE40 Ambient temperature 0°C to 30°C
SAE40 Ambient temperature -10°C to 0°C

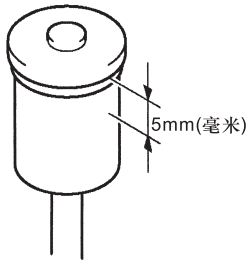
**⚠Caution**

Always use the same brand of oil if possible .

**Leakage inspection**

Check the engine compartment for any oil or fuel leakage.
Clean the radiator if it is clogged and check if there are any foreign objects, such as paper or others, onto the radiator grill .

**(11) Brake fluid inspection**




With the engine off , check the level of the brake fluid in the reservoir tank . The level should be within the range shown in the figure . If the level is below the lower limit , add brake fluid up to the proper level . If the decrease in brake fluid is excessive , the brake system may be leaky . Ask a Good Sense dealer for inspection as early as possible .

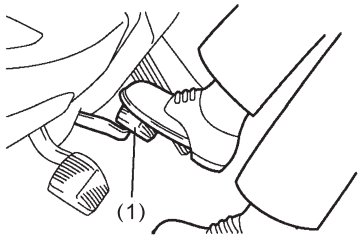
**⚠Warning**

. Never use any oil other than brake fluid .

. Prevent dirt from getting into the reservoir tank . Even a small amount of dirt in the brake fluid can prevent proper braking .

This is extremely dangerous .

. Check the small vent hole in the reservoir tank cap frequently to make sure that it is not clogged with dirt .



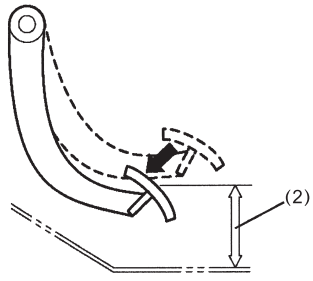

**(12) Brake pedal inspection**

1. Depress the brake pedal fully , and check the floor clearance (clearance between the pedal and floor).

2. Make sure that the pedal does not go any further when it is kept depressed .

3. Also check that no abnormality is observed with pedal depression and return .

4. Manually depress the brake pedal to check the play until a resistance is felt .




(1) Brake pedal
(2) Brake pedal floor clearance

**⚠Warning**

Ask a Good Sense dealer for inspection if the play is excessive, pedal movement is abnormal or brake performance is improper .

(1) Parking Brake lever

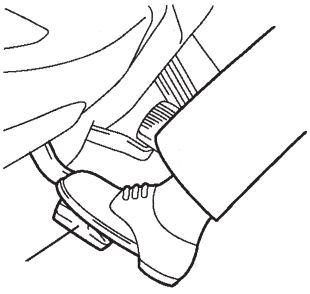
**(13) Parking brake inspection**

**Parking brake lever**

Check the operating force required for pulling the parking lever fully .

**⚠Warning**

Ask a Good Sense dealer for inspection if any abnormality is found .



(1) Inching and brake pedal

**(14)Inching and brake pedal inspection (hydraulic transmission)**

1. Manually depress the inching and brake pedal to check the play until a resistance is felt .

2. Depress the inching and brake pedal and check that there is no destruction or abnormal resistance .

**⚠Caution**

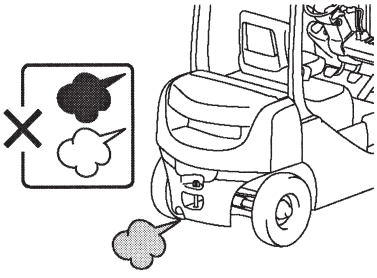
Ask a Good Sense dealer for inspection when any abnormality is found .

**(15) Engine inspection**

Start the engine and warm it up sufficiently .

1. Check each meter and warning lamp to see there is no abnormality .

2. Check if the engine is generating abnormal sound or vibration .



3. Check the exhaust gas color to see it is normal .

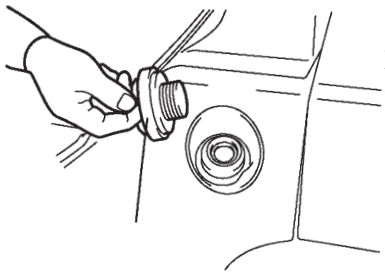
Colorless or light blue exhaust indicates complete combustion ; black exhaust , incomplete combustion ; and white exhaust , burning oil as a result of oil getting into the cylinders .

**⚠Warning**

. The exhaust gas is harmful . Before you start the engine inside a building or enclosure , insure a sufficient ventilation .

. The gasoline engine carburetor is equipped with the automatic choke that keeps the engine running at a relatively high speed for a while .

Do not be bothered , however , becomes the engine resumes a normal speed upon warning enough .



**(16) Fuel level check and supply**

1. Observe the fuel meter to see if the fuel is sufficient .

**Note :**

After the end of daily operation , fill the tank with fuel to prevent the moisture of the air out side the tank from mixing with the fuel .

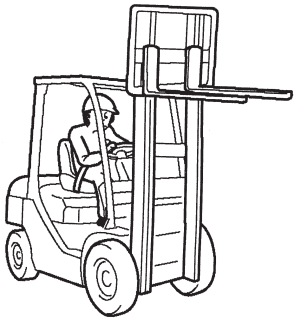
2. When supplying fuel , stop the engine , remove the fuel tank cap by turning it counterclockwise , and pour fuel through the fuel filler neck .

3. After fueling , be sure to tighten the fuel tank cap .

⚠**Caution**

. Always stop the engine and keep any fire source away before and during the fueling operation .

. Carefully prevent entrance of water and dirt into the tank during fueling .

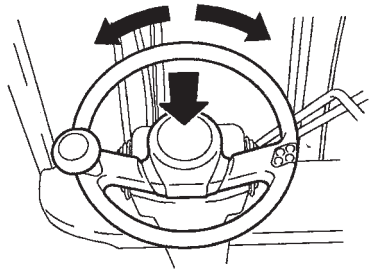


**(17) Load handling system**

1. Check the fork installation state for cracks and bending .

2. Check for mast distortion , chain tension and oil leakage from cylinders and piping .

3. Operate the lift and tilt levers to check their operating state. If anything unusual is found , have the vehicle inspected at a Good Sense dealer .



**(18) Steering wheel inspection**

**Note :**

Perform inspection after starting the engine .

1. Check the steering wheel play with the rear wheel and set in the straight traveling direction .

2. Turn the steering wheel in the circumferential direction and also move it up and down to make sure there is no looseness .

3. Push the horn button to see the horn sounds normally .

4. If any abnormality is found , ask a Good Sense dealer for inspection .

**(19) Safety Inspection**

**Note :**

Keep broad safe space when inspection to prevent the sudden movement of forklift .

Parking Brake Inspection :the forklift can not move or lift until the operator leaves the seat .

**Checking step :**

1. Forklifts should be on the stable and flat ground , and lock the parking brake lever .
2. Set the forward /backward switch on Neutral , starting switch ON and lift the fork 10 cm off ground .
3. Release the brake pedal and the accelerate pedal .
4. Set the forward / backward switch on F or R .
5. Set the starting switch on start shift to check if the starter can work .
6. Close the starting switch .

**4. Operation of the forklift**

(1) The driver who has been trained and held the driver license can drive the forklift

(2) The operator should wear the shoes, hat, clothes and gloves, which can be used as the safety protection during the operation

(3) Check the control and alarm mechanism before driving . If find the damage or flaw, operate after repair

(4) The load should not surpass the standard value during the transportation , the fork should completely insert fully below the goods and put the goods on the fork evenly , using single fork to lift the goods is not allowed

(5)Successfully start the machine , turn around , steer , brake and stop . Drive slowly when turning around on dankish or slippy road surface .

(6) Tilt the mast backward , and lower goods when running .

(7) Carefully driving , when running on the ramp which lean degree more than tenth ,steering forward when up to the ramp , drive reverse when down to the ramp . Forbid turning around , loading and unloading when up or down to the ramp .

(8) Paying attention to passerby , barrier , pothole during the running , also the space above the forklift .

(9) Forbid to stand on the fork and not allowed carry people .

(10) Standing under the forklift and walking under the forklift is not allowed.

(11) Operating the vehicles and apparatus out of the drive seat is not allowed.

(12) Pay attention to the goods in case of falling when lifting the forklift more than three meters, when necessary, take the protective action.

(13) Lean the bracket backward as often as possible in terms of operating the longer lifting fork and the load work should be conducted upward and backward within the minimum range.

(14) Be more careful and drive slowly when driving on the quay or the interim board.

(15) The driver should not be on the forklift and extinguish the generator when adding the fuel and don't lit fire when checking the battery or the position of the oil tank.

(16) When operating the empty forklift, operate it like the loading forklift.

(17) Don't carry unfixed or loose goods and carry the bigger goods more carefully.

(18) The fork should lay groundly, and make the handle on the neutral gear, cut off the power when leaving the forklift; Pull the parking brake when stopping on the slope or flat ground, if would stop for a long time, cushion the tire.

(19) Don't open the lid of the water tank when the generator is very hot.

(20) The pressure of relief valve of control valve and the steering unit has already been set after production, Don't adjust randomly during the operation so as to avoid to destroy the whole hydraulic system or the hydraulic components because of the pressure is too high.

(21) Charging the tire should follow the "Tire pressure " signal.

(22) Forklift noise on the operator seat is measured by sound pressure level while around the operator is measured by sound power level. The noise in the operator seat is not more than 98dB(A), radiated noise is not more than 114dB(A). Vibration pass to operator is less than 5m/s$^2$.

(23) In order to move the extra-wide goods, the users can choose "The super-long fork ". What should be mention is that the loading capacity of the super- long fork should comply with the loading curve. Within the standard loading criteria, its loading capacity should be equal to that of the standard forks, the loading center should be moved forward while downloading the work, but using the tip of fork or colliding the goods are not allowed. Attach great importance to safety when driving or twisting.

(24) Check the chain regularly in the process of using in order to guarantee the good lubricating condition between the chains; the degree of loosing and tightening of the left and right hinge is the same. If the chain has the phenomenon of being damaged in the process of using. When the change values of hinge distance vary from the 2% of the standard volume, the chains must be changed so as to guarantee the safety.

(25) Get protection from the accidental fires and personal injury . The position of fire extinguisher and fire aid boxes should be checked and usage of them should be familiar .

(26) Operate on the rough ground , arouse noise and strengthened vibration could be result in hurting body , such as back pain . Please operate the forklift on the flat road or ground .

(27) Do not dismount the overhead guard and backrest ! Install them for protecting operators from the falling objects . Overhead safeguard meet the safety standard .

(28) Forbid to maintain the forklift at a high position .

(29) Forbid to do dismantlement of Good Sense forklift privately, if indeed demanded , please contact Good Sense sale agent and after service department first .

(30) Please strictly choose Good Sense preparative articles and spare parts . we will not take any corresponding responsibility if you don't normally use appointed Good Sense preparative articles and spare parts .

(31) Pay special attention to the disposal of rejectament in case of polluting environment. Waste liquid should be poured into appointed container . Strictly abide rules and prescribe when dealing with deleterious matters , e.g. sump , impregnant , battery , refrigeration oil .

(32) Please repair the forklift in time when there is something wrong with the forklift . Except some parts which are prescribed in the manual can be repaired by oneself ,please contact the appointed Good Sense sale agent or dealers in time when the forklift should be repair urgently or rush to repair .

(33) Forbid to install or change attachment privately , if in demand , please contact Good Sense sale agent or dealers .

(34) Forbid to operate the forklift in the gale weather . The forklift may have the danger of turning over when loading the super big bulk goods in gale weather .

(35) Must check the emission value after maintenance.

**5. Operating Cautions:**

(1) In the process of using the forklift, if encountering the " boiling of the pot "of the radiator or the high temperature of the cooling water, don't open the radiator immediately. In order to find the reason, open the lid and let the engine run at the middle speed and then twist the radiator lid slowly, put the generator lid away again after a while to prevent the cooling liquid spurting and hurting the operators. While twisting the radiator lid, twist in the right position; otherwise cannot establish the standard pressure system.

(2) To the radiator which use the pure water as the cooling fluid, the water of the radiator can be discharged only when the water will be frozen in the cold weather . The radiator should be removed and be washed in the boiling soda water so as to eliminate the pollutants and sediments of the radiator.

(3) To the radiator of which the cooling liquid often uses the rustproof or antifreeze liquid (model FD-2 minor 35), the different kind of antifreeze liquid and water can't be added randomly. The same type of the rustproof and antifreeze liquid should be added when the antifreeze liquid is leaking or evaporating. The antifreeze liquid can be used both in summer and winter and doesn't need to be changed for a whole year. Generally, it should be discharged and be filtered, then continue to use.

(4) According to the different working conditions, the dust on the surface of the generators should be removed regularly with detergents or the condensed air or high-pressure water (the pressure is less than 4kg/cm) .

## 6. The oil of lift fork

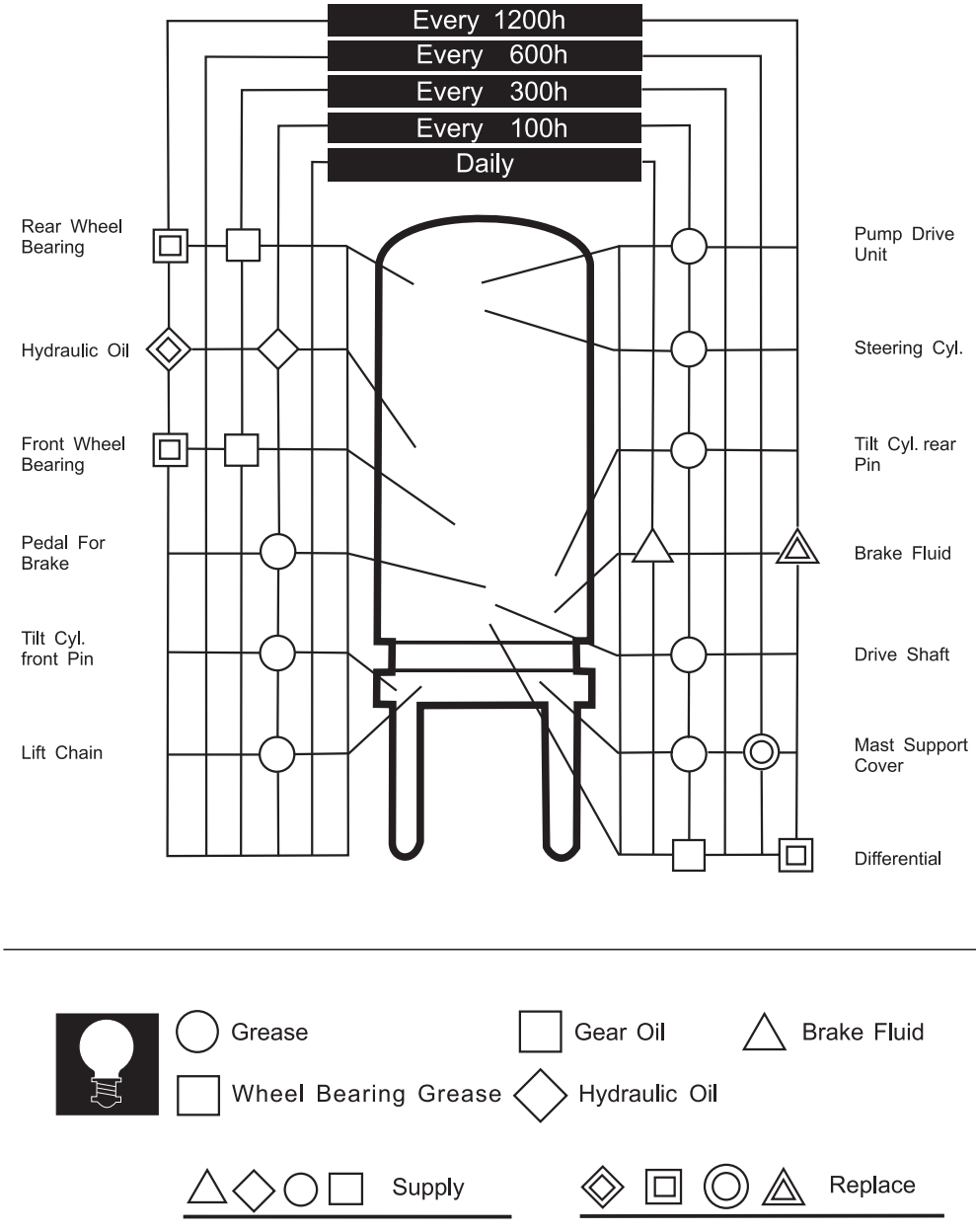
| Name | The code name (domestic) | Code name (abroad) |
|---|---|---|
| Gasoline | RQ-85 | JISK2202, 2# |
| Diesel | Use the diesel maintenance illustration or the GB252-94 light diesel: summer 0#, winter 10~-35#, the general region summer 0#, winter 10#, the north east region 25#, guangdong region 10# | JISK2204, 2# (general region) |
| | | JISK2204, 3# (cold region) |
| Lubrication | Choose according to the generator main-tenance illustration, or gasoline machine: GB485-84, diesel Machine: GB1112289 standard criteria and working conditions. | SAE10W (winter) |
| | | SAE30 (summer) |
| Hydraulic oil | N32# or N46# | ISOVG30 |
| Fluid trans-mission oil | 6# fluid transmission oil | SAE10W |
| Gear oil | 85W/90 | SAE90/SAE80W |
| Braking fluid | 4604 synthesis braking fluid | JISK-2233 |
| Lubrication | 3# dropping point of grease 170 | JISK-2220, 1#, 2# |

Removable parts

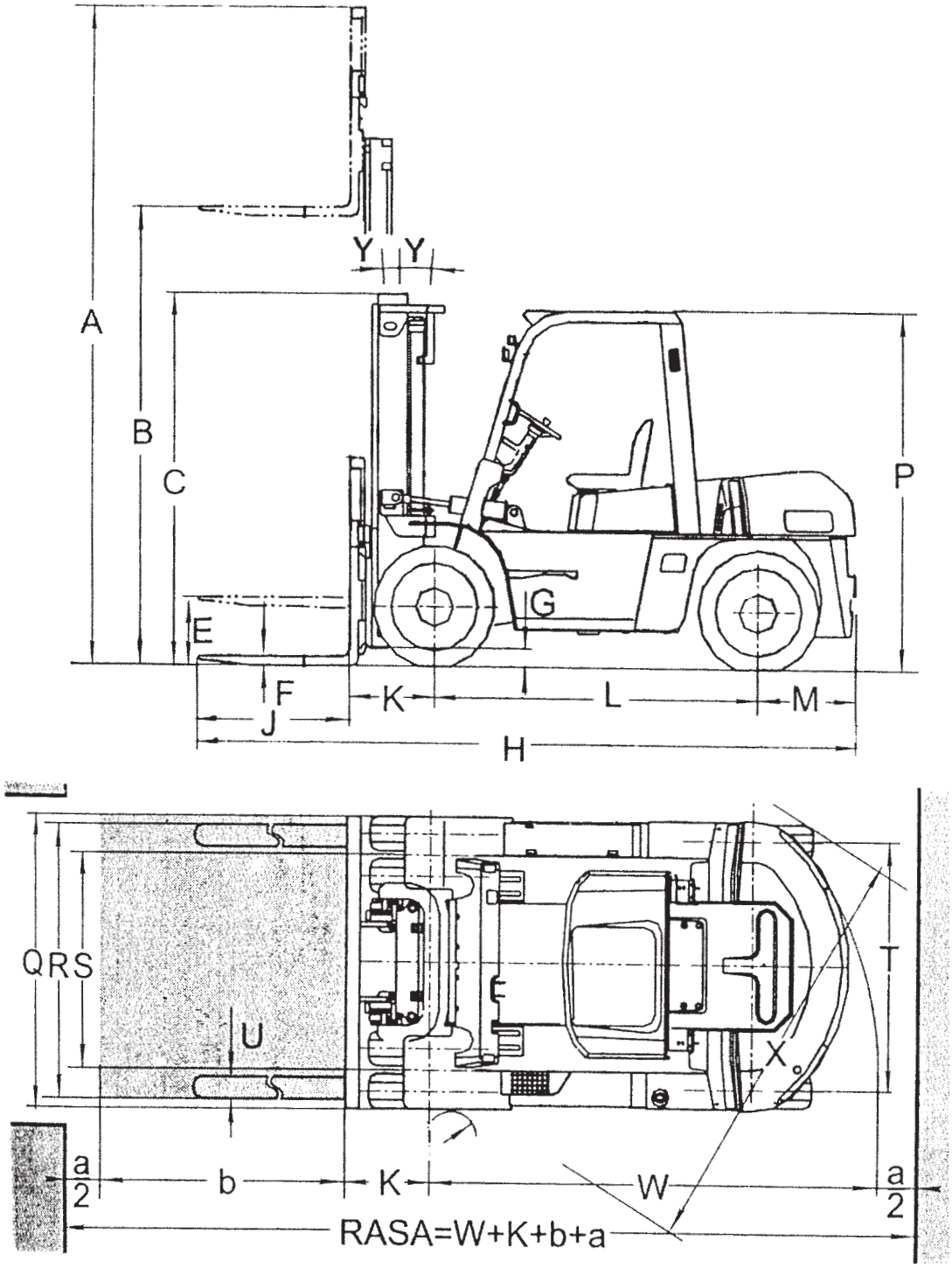
| Item \ Model | | Units | FD50 | FD60 | FD70 | FD80 | FD100 |
|---|---|---|---|---|---|---|---|
| Mast | Exterior size | mm | 2300×1966×770 | | 2300×1966×770 | 2450×2245×925 | 2600×2245×925 |
| | weight | kg | 1562 | | 1607 | 2150 | 2458 |
| Counter weight | Exterior size | mm | 1205×1970×1175 | | 1325×1970×1175 | 1325×1980×1166 | 1060×1980×1170 |
| | weight | kg | 2500 | 3000 | 3600 | 4350 | 4950 |

7. **Lubrication system picture**:

# LUBRICATION SYSTEM DIAGRAM



## Ⅲ. Primary technic parameter of forklift




Forklift Figure

# Main technical parameter

| | | | 5t | 6t | 7t | 8t | 10t |
|---|---|---|---|---|---|---|---|
| Rated Capacity | | Kg | 5000 | 6000 | 7000 | 8000 | 10000 |
| Load center | | mm | 600 | | | | |
| Max lift heigh ( STD) B | | | 3000 | | | | |
| Free lift heigh ( STD) E | | | 195 | 200 | 205 | 200 | 210 |
| Mast tilt angle Y/Y | | (°) / (°) | 6/12 | | | | |
| Min. turning radius W | | mm | 3250 | 3300 | 3370 | 3700 | 3950 |
| Min. intersecting aisle X | | | 2960 | 3000 | 3040 | 3310 | 3540 |
| Min. under clearance G | | | 200 | | | 250 | 245 |
| Wheelbase L | | | 2250 | | | 2500 | 2800 |
| Tread Fed/bwd S/T | | | 1470/1700 | | | 1600/1700 | |
| Overhang Fwd/bwd K/M | | | 590/600 | 590/675 | 590/740 | 710/740 | 710/740 |
| Overall length H | | | 4660 | 4735 | 4800 | 5160 | 5480 |
| Overall width Q | | | 1995 | | | 2165 | 2245 |
| Overall height | Mast C | | 2500 | | 2625 | 2700 | 2850 |
| | Overhead guard P | | 2450 | | | 2560 | |
| Height as fork lifting (With backrest) A | | | 4420 | | | | 4330 |
| Fork | Length J | | 1220 | | | | |
| | Width(U)× thickness (F) | | 150×55 | 150×60 | 150×65 | 170×70 | 175×80 |
| Fork adjustable space (outside of fork) R | | | 300-1700 | | | 340-1944 | 410-2140 |
| Truck weight | | Kg | 7980 | 8640 | 9350 | 10850 | 12510 |
| Axle load | Loaden (fwd/bwd) | | 11660/1320 | 13050/1590 | 14570/1780 | 17000/1950 | 20380/2130 |
| | Unloaden (fwd/bwd) | | 4010/3970 | 3880/4760 | 3860/5490 | 4840/6120 | 5700/6810 |
| Tyre | Front 4 | | 8.25-15-14PR | | | 9.00-20-14PR | |
| | Rear 2 | | 8.25-15-14PR | | | 9.00-20-14PR | |
| Battery (voltage/capacity) | | V/Ah | 24/105 | | | | |

| Item | | Unit | FD50-WX | FD60-WX | FD70-WX | FD50-C10 | FD60-C10 |
|---|---|---|---|---|---|---|---|
| Rated Capacity | | Kg | 5000 | 6000 | 7000 | 5000 | 6000 |
| Load center | | mm | 600 | | | | |
| Max lift heigh ( STD) | | | 3000 | | | | |
| Free lift heigh ( STD) | | | 205 | | | | |
| Mast tilt angle | | (°) / (°) | 6/12 | | | | |
| Min. turning radius | | mm | 3250 | 3300 | 3370 | 3250 | |
| Min. under clearance | | | 200 | | | | |
| Wheelbase | | | 2250 | | | | |
| Tread Fed/bwd | | | 1470/1700 | | | | |
| Overall length | | | 4660 | 4735 | 4800 | 4802 | |
| Overall width | | | 1995 | | | | |
| Overall height | Mast | | 2500 | | | | |
| Truck weight | | Kg | 7980 | 8640 | 9350 | 8640 | |
| Max. traveling speed Laden/ Unladen | | Km/h | 29/32 | | | 26/28 | |
| Lift speed | Laden | mm/s | 400 | 400 | 300 | 430 | |
| | Unladen | | 410 | 410 | 410 | 500 | |
| Max. traction force | Laden | KN | 42 | | 41 | 54 | |
| | Unladen | | 22 | | | | |
| Type | Front 4 | | 8.25-15-14PR | | | 8.25-20-14PR | |
| | Rear 2 | | 8.25-15-14PR | | | | |
| Gradeability laden | | % | 25 | 22 | 20 | 15 | |

| Item | | Unit | FD50-CU1 | FD60-CU1 | FD70-CU1 | FD80-CU | FD100-CU |
|---|---|---|---|---|---|---|---|
| Rated Capacity | | Kg | 5000 | 6000 | 7000 | 8000 | 10000 |
| Load center | | mm | 600 | | | | |
| Max lift heigh ( STD) | | | 3000 | | | | |
| Free lift heigh ( STD) | | | 205 | | | | |
| Mast tilt angle | | (°) / (°) | 6/12 | | | | |
| Min. turning radius | | mm | 3250 | 3300 | 3370 | 3700 | 3900 |
| Min. under clearance | | | 200 | | | 245 | |
| Wheelbase | | | 2250 | | | 2500 | 2800 |
| Tread Fed/bwd | | | 1470/1600 | | | 1600/1700 | |
| Overall length | | | 4660 | 4735 | 4800 | 5160 | 5480 |
| Overall width | | | 1995 | | | 2245 | |
| Overall height | Mast | | 2500 | | | 2700 | 2850 |
| Truck weight | | Kg | 7980 | 8640 | 9350 | 10960 | 12510 |
| Max. traveling speed Laden/ Unladen | | Km/h | 26/30 | | | | |
| Lift speed | Laden | mm/s | 370 | 350 | 285 | 440 | 360 |
| | Unladen | | 400 | | 300 | 470 | 380 |
| Max. traction force | Laden | KN | 42 | 40 | 40 | 60 | 58 |
| | Unladen | | 22 | | | 27 | 31 |
| Type | Front 4 | | 8.25-15-14PR | | | 9.00-20-14PR | |
| | Rear 2 | | 8.25-15-14PR | | | 9.00-20-14PR | |
| Gradeability laden | | % | 23 | 20 | 20 | 27 | 22 |

| Item \ Model | | | FD50~70-W3 | | FD50~70-C1 | | FD50~60-WF$_2$ | |
|---|---|---|---|---|---|---|---|---|
| Engine | Type | | ISUZU(diesel) A-6BG1QC | | Chaoyang(diesel) 6102BG | | Weifang(diesel) R4105G32 | |
| | Cyl. Number-Bore × stroke | mm | 6-105×125 | | 6-102×118 | | 4-105×125 | |
| | Rated output / speed | KW/rpm | 82.3/2000 | | 81/2500 | | 59/2400 | |
| | Max. torque/speed | Nm/rpm | 416/1400~1600 | | 353/1650 | | 270/1400~1600 | |
| | Min. fuel consumption | g/KWh | 233 | | 231 | | 243 | |
| Speed gear Fwd/Bwd | | | Power shift | | | | | |
| Brake | | | Power brake | | Vacuum assistant or power brake | | Vacuum assistant | |
| Lifting speed laden/unladen | | mm/s | 500/550 | 460/500 | 460/600 | 400/600 | 330/480 | |
| Max. travel speed laden/unladen | | Km/h | 26/30 | | 26/28 | | 26/30 | |
| Max. gradeability | | % | 35/19 | 32/19 | 30/19 | 20/15 | 26/23 | 22/20 |
| Max. traction force (laden) | | KN | 54 | | 53 | 53 | 52 | 41.45 |

| Item \ Model | | | FD80-W4 | FD100-W4 | FD80-W4 | FD100-C3 |
|---|---|---|---|---|---|---|
| Engine | Type | | ISUZU(diesel) A-6BG1QC | | Chaoyang(diesel) 6102BG | |
| | Cyl. Number-Bore × stroke | mm | 6-105×125 | | 6-102×118 | |
| | Rated output / speed | KW/rpm | 82.3/2000 | | 81/2500 | |
| | Max. torque/speed | Nm/rpm | 416/1400~1600 | | 353/1650 | |
| | Min. fuel consumption | g/KWh | 233 | | 231 | |
| Speed gear Fwd/Bwd | | | Power shift | | | |
| Brake | | | Power brake - pedal brake | | | |
| Lifting speed laden/unladen | | mm/s | 380/410 | 310/350 | 390/480 | 310/390 |
| Max. travel speed laden/unladen | | Km/h | 26/30 | | | |
| Max. gradeability | | % | 21/21 | | 21/21 | 20/15 |
| Max. traction force (laden) | | KN | 63.2 | 58 | 51 | 57 |

| Specification | | Unit | FD50~70-WX | FD50~60-C10 |
|---|---|---|---|---|
| Model | | | CA4110 | 6102GB-A6B |
| Type | | | In line 4-cylinder.4-cycle. water-cooled.direct injection | In line 6-cylinder.4-cycle. water-cooled.direct injection |
| Cyl. Number-Bore × stroke | | mm | 4-110×125 | 6-102×118 |
| Total displacement | | 1 | 4.752 | 6.494 |
| Compression Ratio | | | 17:1 | 17 |
| Engine | Rated speed | r/min | 2300 | 2200 |
| | Rated output | kw | 64 | 73 |
| | Max. torque | Nm | 305/1400~1600rpm | 353/1650rpm |
| | Max. speed (unladen) | rpm | 2530 | |
| | Min. speed (unladen) | rpm | 700 | |
| | Min. fuel consumption (laden) | g/kwh | 230 | |

| Specification | | Unit | FD50~70-CU1 | FD800~100-CU |
|---|---|---|---|---|
| Model | | | B3.3-C80 | 4BTAA3.9-C110 |
| Type | | | In line 4-cylinder.4-cycle.water-cooled.direct injection | |
| Cyl. Number-Bore × stroke | | mm | 4-95×115 | 4-102×120 |
| Total displacement | | 1 | 3.26 | 3.9 |
| Compression Ratio | | | 17.5:1 | 18:1 |
| Engine | Rated speed | r/min | 2200 | 220 |
| | Rated output | kw | 60 | 82 |
| | Max. torque | Nm | 291/1600~1600rpm | 468/1500rpm |
| | Max. speed (unladen) | rpm | 2450 | 2450 |
| | Min. speed (unladen) | rpm | 800 | 850 |
| | Min. fuel consumption (laden) | g/kwh | 217 | 216 |

## IV. Periodic Servicing

This service schedule is worked out on the assumption that the lift truck will be used under typical working conditions. If the lift truck is used under severer working conditions, earlier preventive maintenance services are required. (The black dots in the table means "Replacement".)

ENGINE

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Engine | Visually inspect condition of engine rotation. | | ○ | ○ | ○ | ○ | ○ |
| | Check for working noise from engine. | | ○ | ○ | ○ | ○ | ○ |
| | Check that exhaust gas has proper-color. | | ○ | ○ | ○ | ○ | ○ |
| | Check air cleaner element for dirt and clean. | | | ○ | ○ | ● | ● |
| | Check crankcase air breather for dirt and clean | | | | ○ | ○ | ○ |
| | Check that valve clearnce is correct. | Thickness gauge | | | | ○ | ○ |
| | Check cylinders for proper compression. | Compres-sion gauge. | | | | | ○ |
| PCV Device | Check metering valve and pipe for clogging or damage (G). | | | | | ○ | ○ |
| Governor or Injection Pump | Check no-load maximum rpm. | Tachometer | | | | | ○ |
| Lubrica-tion System | Check for engine oil leak. | | ○ | ○ | ○ | ○ | ○ |
| | Check engine oil for level and dirt. | | ○ | ○ | ○ | ○ | ○ |
| | Replace engine oil. | | | ● (at initial 25 hrs) | ● | ● | ● |
| | Replace engine oil filter cartridge. | | | ● (at initial 200 hrs) | ● | ● | ● |

ENGINE

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Fuel System | Visually check for fuel leak from pipe, pump or tank. | | ○ | ○ | ○ | ○ | ○ |
| | Check fuel filter for clogging. | | | | ○ | ○ | ○ |
| | Replace fuel filter cartridge. | | | | ● | ● | ● |
| | Check that injection nozzle has correct inject press and pattern. | Nozzle tester | | | | ○ | ○ |
| | Check for injection timing. | | | | | | ○ |
| | Drain off water from fuel tank. | | | | ○ | ○ | ○ |
| | Clean fuel tank. | | | | | ○ | ○ |
| | Check for fuel level. | | ○ | ○ | ○ | ○ | ○ |
| Cooling System | Check for coolant level. | | ○ | ○ | ○ | ○ | ○ |
| | Check for coolant leak. | | ○ | ○ | ○ | ○ | ○ |
| | Check hoses for deterio-ration. | | | | ○ | ○ | ○ |
| | Check radiator cap for condition and installation. | | ○ | ○ | ○ | ○ | ○ |
| | Clean and change coolant. | | | | ● | ● | ● |
| | Check fan belt for tension and damage. | | ○ | ○ | ○ | ○ | ○ |

POWER TRAIN

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Torque converter transmi-ssion | Check for oil leaks. | | ○ | ○ | ○ | ○ | ○ |
| | Check for oil level, or change oil. | | | ○ | ○ | ● | ● |

POWER TRAIN

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Torque converter transmission | Check change level for operation and looseness. | | | ○ | ○ | ○ | ○ |
| | Check control valve and clutch for proper operation. | | ○ | ○ | ○ | ○ | ○ |
| | Check inching valve for proper operation. | | ○ | ○ | ○ | ○ | ○ |
| | Check inching pedal for free travel and pedal travel. | | ○ | ○ | ○ | ○ | ○ |
| | Replace line filter element. | | | ● (at initial 200 hrs) | | ● | ● |
| Front Axle | Check for oil leak. | | ○ | ○ | ○ | ○ | ○ |
| | Change oil. | | | | | ● | ● |
| | Check mounting bolts for looseness. | Test hammer | | ○ | ○ | ○ | ○ |

WHEELS

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Tires | Check for inflation pressure. | Tire gauge | ○ | ○ | ○ | ○ | ○ |
| | Check for cracks or damage. | | ○ | ○ | ○ | ○ | ○ |
| | Check for tread wear. | Depth gauge | | ○ | ○ | ○ | ○ |
| | Check for undue wear. | | ○ | ○ | ○ | ○ | ○ |
| | Check for spikes, stones, or foreign matter. | | | ○ | ○ | ○ | ○ |
| Tire Fastners | Check for looseness. | Test hammer | ○ | ○ | ○ | ○ | ○ |
| | Check for damage. | | ○ | ○ | ○ | ○ | ○ |
| Rim,side ring | Check for rim, side ring and disk wheel for damage. | | ○ | ○ | ○ | ○ | ○ |

WHEELS

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Wheel Bearing | Check for looseness and noise. | | | ○ | ○ | ○ | ○ |
| | Clean and repack grease. | | | | | ● | ● |
| Axle | Check axle for deformation, cracks or damage. | | | ○ | ○ | ○ | ○ |

STEERING SYSTEM

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Steer Handwheel | Check for peripheral play. | | ○ | ○ | ○ | ○ | ○ |
| | Check for vertical looseness. | | ○ | ○ | ○ | ○ | ○ |
| | Check for sideways looseness. | | ○ | ○ | ○ | ○ | ○ |
| | Check for proper operation. | | ○ | ○ | ○ | ○ | ○ |
| Steering gear box | Check mounting bolts for looseness. | | | ○ | ○ | ○ | ○ |
| Knuckle rear axle | Check king pins for looseness or damage. | | | ○ | ○ | ○ | ○ |
| | Check for deflection,deformation, cracks or damage. | | | ○ | ○ | ○ | ○ |
| | Check for mounting condition. | Test hammer | | ○ | ○ | ○ | ○ |
| Power steering | Check for operation. | | ○ | ○ | ○ | ○ | ○ |
| | Check for oil leaks. | | ○ | ○ | ○ | ○ | ○ |
| | Check for mounting parts and joints for looseness. | | | ○ | ○ | ○ | ○ |

BRAKE SYSTEM

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Brake pedal | Check for free travel. | | ○ | ○ | ○ | ○ | ○ |

BRAKE SYSTEM

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Brake pedal | Check for pedal travel. | Scale | ○ | ○ | ○ | ○ | ○ |
| | Check for proper operation. | | ○ | ○ | ○ | ○ | ○ |
| | Check for air mixed in brake piping. | | ○ | ○ | ○ | ○ | ○ |
| Parking Brake Lever | Check that lever is securely locked and has sufficient lever stroke. | | ○ | ○ | ○ | ○ | ○ |
| | Check for proper operation. | | ○ | ○ | ○ | ○ | ○ |
| Rod, cable, etc. | Check for operation. | | | ○ | ○ | ○ | ○ |
| | Check connections for looseness. | | | ○ | ○ | ○ | ○ |
| Hoses and pipes | Check for damage, leakage or collapse. | | | ○ | ○ | ○ | ○ |
| | Check for loose connections or clamping parts. | | | ○ | ○ | ○ | ○ |
| Brake master cylinder wheel cylinder | Check for fluid leaks. | | | ○ | ○ | ○ | ○ |
| | Check for fluid level. Change brake fluid. | | ○ | ○ | ○ | ● | ● |
| | Check master cylinder and wheel cylinders for proper operation. | | | | | | ○ |
| | Check master cylinder and wheel cylinders for fluid leaks or damage. | | | | | | ○ |
| | Check master piston cup, and check valve for wear or damage. Change. | | | | | | ● |
| Brake Drum & Brake Shoe | Check drum mounting part for looseness. | Test hammer | | ○ | ○ | ○ | ○ |
| | Check lining for wear. | Slide calipers | | | | | ○ |
| | Check brake shoes for proper operation. | | | | | | ○ |
| | Check anchor pin for rust. | | | | | | ○ |
| | Check return spring for deterioration. | Scale | | | | | ○ |
| | Check automatic clearance adjuster for operation. | | | | | | ○ |
| | Check drum for wear or damage. | | | | | | ○ |

BRAKE SYSTEM

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Back Plate | Check back plate deformation. | | | | | | ○ |
| | Check for craks. | Penetrant test | | | | | ○ |
| | Check mounting parts for looseness. | Test hammer | | | | | ○ |

LOADING SYSTEM

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Fork | Check forks for damage, deformation or wear. | | ○ | ○ | ○ | ○ | ○ |
| | Check for stopper pins for damage or wear. | | | | ○ | ○ | ○ |
| | Check fork base and hook weldings for defective cracks or wear. | | | ○ | ○ | ○ | ○ |
| Mast & Lift Bracket | Check cross members on outer and inner masts for defective weld, cracks or damage. | | | ○ | ○ | ○ | ○ |
| | Check tilt cylinder bracket and masts for defective weld, cracks or damage. | | | ○ | ○ | ○ | ○ |
| | Check outer and inner masts for defective weld, cracks or damage. | | | ○ | ○ | ○ | ○ |
| | Check for defective weld, cracks or damage of lift bracket. | | | ○ | ○ | ○ | ○ |
| | Check roller bearings for looseness. | | | ○ | ○ | ○ | ○ |
| | Check mast support bushings for wear or damage. | | | | | | ○ |
| | Check mast support cap bolts for looseness. | Test hammer | | ○ (for 1st time only) | | ○ | ○ |
| | Check lift cylinder tail bolts, piston rod head bolts, U-bolts, and piston head guide bolts for looseness. | Test hammer | | ○ (for 1st time only) | | ○ | ○ |
| | Check rollers, roller pins and welded parts for craks or damage. | | | ○ | ○ | ○ | ○ |
| Chains & Sheave | Check chains for tension, deformation, damage or rust. | | ○ | ○ | ○ | ○ | ○ |
| | Lubrication of chains. | | | ○ | ○ | ○ | ○ |

LOADING SYSTEM

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Chains & Sheave | Check connection of chain anchor pin and chain for looseness. | | | ○ | ○ | ○ | ○ |
| | Check sheave for deformation or damage. | | | ○ | ○ | ○ | ○ |
| | Check sheave for deformation or damage. | | | ○ | ○ | ○ | ○ |
| Optional Attachment | Perform general inspection | | | ○ | ○ | ○ | ○ |
| Cylinders | Check piston rod, screw and rod end for looseness, deformation or damage. | Test hammer | ○ | ○ | ○ | ○ | ○ |
| | Check cylinders for proper operation. | | ○ | ○ | ○ | ○ | ○ |
| | Check for oil leaks. | | ○ | ○ | ○ | ○ | ○ |
| | Check pins and cylinder bushings for wear or damage. | | | ○ | ○ | ○ | ○ |
| Hydraulic Pump | Check hydraulic pump for oil leaks or noise. | | ○ | ○ | ○ | ○ | ○ |
| | Check pump drive gear for wear. | | | ○ | ○ | ○ | ○ |

HYDRAULIC SYSTEM

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Hydraulic Reservoir | Check for oil level. Change oil. | | ○ | ○ | ○ | ● | ● |
| | Clean suction strainer. | | | | | ○ | ○ |
| | Drain foreign matter. | | | | | ○ | ○ |
| Return Filter | Replace return filter. | | | | | ● | ● |
| Control Lever | Check levers for looseness at link. | | ○ | ○ | ○ | ○ | ○ |
| | Check for proper operation. | | ○ | ○ | ○ | ○ | ○ |
| Control Valve | Check for oil leaks. | | ○ | ○ | ○ | ○ | ○ |
| | Check relief valve and tilt lock valve for proper operation. | | | ○ | ○ | ○ | ○ |

HYDRAULIC SYSTEM

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Control Valve | Measure relief pressure. | Oil pres. gauge. | | | | ○ | ○ |
| Hose, piping hose Reel & Swivel Joint | Check for oil leaks, looseness, collapse, deformation and damage. | | ○ | ○ | ○ | ○ | ○ |
| | Change hoses. | | | | | | ● (1 or 2 years) |

ELECTRICALS

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Starter | Check pinion gear for correct engagement. | | | | ○ | ○ | ○ |
| Battery | Check battery electrolyte level. Clean battery. | | | ○ | ○ | ○ | ○ |
| | Check specific gravity of electrolyte. | Hydrometer | | | ○ | ○ | ○ |
| Wiring | Check wire harness for damage and clamps for looseness. | | | ○ | ○ | ○ | ○ |
| | Check connections for looseness. | | | | ○ | ○ | ○ |

SAFETY APPARATUS & ACCESSORIES

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Overhead Guard & Load Backrest | Check for tight installation. | Test hammer | ○ | ○ | ○ | ○ | ○ |
| | Check for deformation, cracks or damage. | | ○ | ○ | ○ | ○ | ○ |
| Turn Signal | Check for proper operation and tight installation. | | ○ | ○ | ○ | ○ | ○ |
| Horn | Check for proper operation and tight installation. | | ○ | ○ | ○ | ○ | ○ |
| Lights & Lamps | Check for proper operation and tight installation. | | ○ | ○ | ○ | ○ | ○ |
| Back-up Buzzer | Check for proper operation and tight installation. | | ○ | ○ | ○ | ○ | ○ |
| Rear View Mirror | Check for dirt or damage. | | ○ | ○ | ○ | ○ | ○ |

SAFETY APPARATUS & ACCESSORIES

| Checking Item | Service Required | Tools | Daily (8hrs) | Monthly (200hrs) | Trimonthly (600hrs) | Semainnually (1200hrs) | Annualy (2400hrs) |
|---|---|---|---|---|---|---|---|
| Rear View Mirror | Check for good field of vision. | | ○ | ○ | ○ | ○ | ○ |
| Meters | Check meters for proper operation. | | ○ | ○ | ○ | ○ | ○ |
| Driver's Seat | Check for damage or loose bolts. | | | | | ○ | ○ |
| Body | Check frame and cross members for damage or cracks. | | | | | | ○ |
| | Check for loose rivets or bolts. | Test hammer | | | | | ○ |
| | Check items repaired in preceding inspection, if any. | | ○ | ○ | ○ | ○ | ○ |
| | Inspection general condition of body. | | | | | | ○ |
| Grease-up & oil change | After cleaning, check for greased condition of chassis. | Grease pump | | ○ | ○ | ○ | ○ |
| | Check oil condition of oil and fluid in reservoir. | | | | | | ○ |

▲ CAUTION

Local refined oils and cooling water, coolant, or anti-freeze do not allow the same operation period designated in this manual.

So must be changed more frequently as half or quarter of the designated period in this manual.

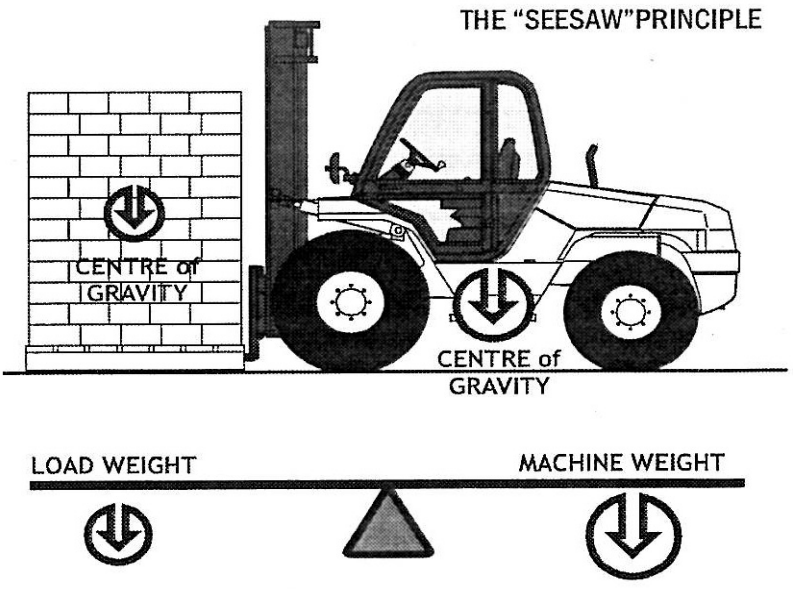
Multi-viscosity oils allow a wider temperature range for operation but must be changed more frequently as the addition that provides the multi-viscosity gradually deteriorates lowering the viscosity. Degradation of viscosity at the higher temperatures can be very detrimental to the hydraulic system.

# *Guidelines and Safety Rules for Operators of Lift Trucks*

**LIFT TRUCKS: The Basics**

In order to have an appreciation for all the features available and characteristics of modern lift trucks, it is necessary first to have a basic understanding of how a lift truck works. Why a particular type of truck is selected to do a particular type of work, the importance of truck specifications, the advantages and disadvantages of each truck type, human factors (as they relate to truck selections), and optional equipment available on lift trucks, are all vital for operation. The purpose of this section is to provide the reader with basic knowledge in those areas before going on to more detail in future sections.

**How Does it Work?**




If the load is lifted outside the lines of all four of its wheels, a heavy weight is used at the end of the truck opposite the forks to offset or counter-weight the load. This weight is called a counter-weight I fact. This type of truck is called a counterbalance truck and is the most commonly used type of truck. The principle, which makes this truck capable of lifting extremely heavy loads, is sometimes referred to as the "seesaw principle." Imagine two children playing on a seesaw, one being considerably heavier than the other is. The lighter child can counterbalance the heavier child if the heavier child sits close to the fulcrum or pivot point. Now image that the lighter child is the counterweight of a truck and the heavier child is the lead. The fulcrum would represent the drive wheels. It is easy to see that if the heavier child were much heavier, he would tip the seesaw regardless of how near the pivot point he sat. In addition, if he sat at the far tip of the seesaw, the small boy would again be unable to counterbalance him. This same principle exists when there is a load on a counterbalance truck. If the load is too heavy or is placed too far out on the forks, the load can overcome the counterweight and tip the truck.

**Equipment Terminology**

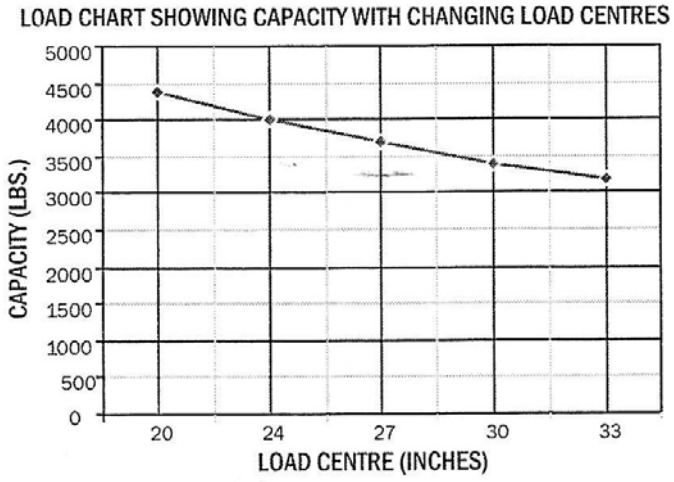
The following characteristics are common to the many types of lift trucks available:

| | |
|---|---|
| Capacity | The maximum load at maximum elevation that a lift truck may accommodate, as rated by its manufacturer. |
| Load Centre | Calculated by measuring the distance from the fork face to the centre of the gravity load. |

| | |
|---|---|
| Centre of Gravity | The point that represents the mean position of the weight of an object. There are times when it is necessary to determine the centre of gravity of the load, the truck, or the load and the truck combined. |
| Weight | Truck weight is determined as the total mass the unit (with accessories), as well as the battery (in the case of electric-powered vehicles). |

**Lifting Capacity**

As rated by the manufacturer, the lifting capacity of the unit is the maximum load that can be lifted to the specified maximum elevation. This capacity is usually identified on the truck identification/capacity plate, located in the driver's area. As identified earlier, the capacity of the unit is affected by the load's position relative to its fulcrum. As the load's centre moves away from the pivot point, there is a decrease in the capacity of the lift truck (see Appendix B). Any attachments added to the truck such as a sideshifter or paper-roll clamp will also decrease this rated lifting capacity. If the attachments were added by the manufacturer prior to delivery, then the nameplate should indicate the decreased load capacity. If the truck has an attachment, and the identification plate fails to note the adjusted rating, then the manufacturer or dealer should be contacted to obtain the correct adjusted rating.




| Capacity | Load Centre |
|---|---|
| 4400 | 20" |
| 4000 | 24" |
| 3700 | 27" |
| 3400 | 30" |
| 3200 | 33" |

Based on 154" Fork-Height, on a unit rated for 4,000 lbs. @ 24" Load Centre

**Stability Triangles**

The stability triangle is a triangle, which has one point in the centre of each front wheel and one point at the pivot pin or centre of the steering wheel's axle. This stability triangle is also called the "lines of side support" as long as the centre of gravity stays within the stability triangle, the lift truck will stay upright. When the combined centre of gravity touches or moves outside these boundaries, the lift truck must tip over in that direction.

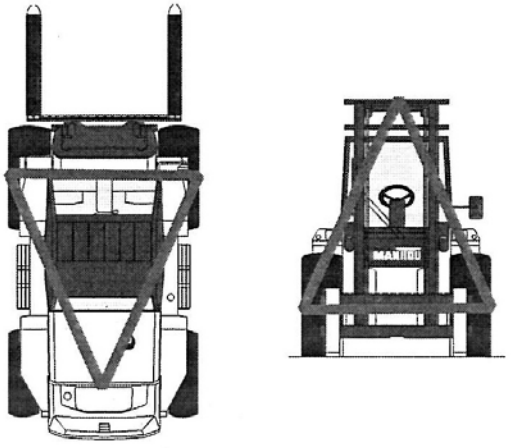
**Centre of Gravity**

Trucks tip over because their "centre of gravity' moves outside of the 'stability triangle'. The centre of any object is the point within the object from which the object could be hung in midair,

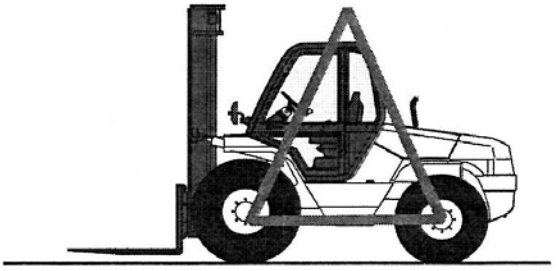
perfectly balanced. The centre of gravity of an un-loaded lift truck is a point within the truck near its centre. For example, the centre of gravity of an unloaded internal combustion lift truck is close to the rear of the engine.

The centre of gravity of a forklift truck combined with its load is placed on the forks the combined centre of gravity moves forward, toward the forks. If the load is raised, the centre of gravity moves upward and backwards. Tilting the upright back brings the centre of gravity back, tilting the upright forward moves the centre of gravity forward. An unbalanced load causes the centre of gravity to move toward the heavier side of the load. Cornering moves the centre of gravity to move toward the side of the vehicle. Excessive speed when cornering is particularly dangerous. Any time the centre of gravity moves outside of the side of the stability triangle, the forklift truck must tip over on that side.

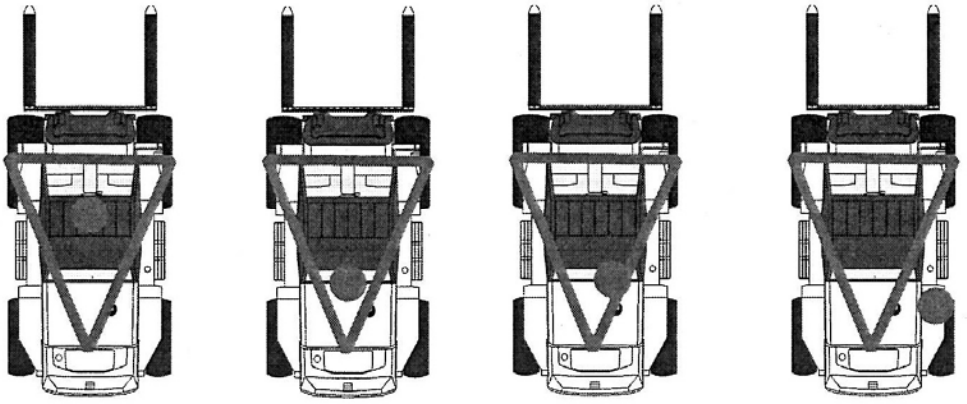
You may note that some trucks have more degrees of tilt both forward and backward than others. This can be true even if you are looking at the same model of one particular manufacturer. The reason of this is that one of these trucks lifts higher. Notice that when the "centre of gravity' has been moved backward,



STABILITY TRIANGLES



EFFECTS OF UNSTABLE CENTRES OF GRAVITY



Truck Empty

Load Raised & Tilted Back

Vehicle Makes Fast Turn

Truck Tips Over

such as when raising a load or tilting it backwards, the centre of gravity is much closer to the sides of the "stability triangle'. Thus, a truck in this condition is more susceptible to have its 'centre of gravity' move outside of the 'stability triangle' because of fast cornering, passing over an obstruction on the floor or carrying an unbalanced load. Anytime the centre of gravity moves outside of the sides of the stability triangle, the forklift truck must tip over.

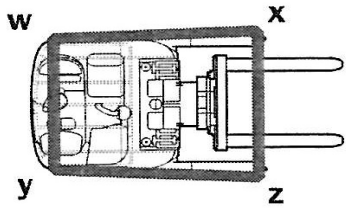
**Weight and Capacity**

The capacity data plate on a lift truck gives information about the machine's weight and capacity. These are important factors when your operators are working in elevators, railroad cars, tractor trailers, or floors with predefined weight limits (such as wood floors). Operators must understand that lift trucks are heavy. They will need to keep in mind the weight of their machine and its load as they work on different surfaces. This is especially important when considering the 'see-saw" principle when determining the appropriate match of truck weight to load.

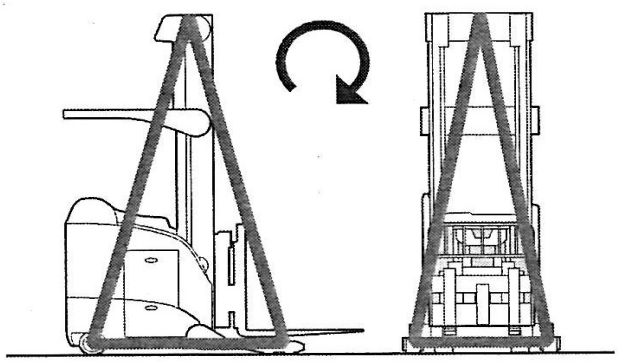
In electric trucks the battery acts as a counterweight. The data plate gives the approximate weight of the truck with the battery installed. If batteries are changed or replaced, the weight of the battery must meet the specifications found on the data plate.

**Narrow-Aisle Equipment**

All of the above can be applied to narrow-aisle trucks with suspension points W, X, Y, Z. This four-sided shape is often referred to as a stability trapezoid. Although these trucks apparently have better side stability, they are more subject to tipping over backwards because of their shorter wheelbase. Backing a narrow-aisle out of a storage area with the load raised is particularly dangerous, especially if the mast is titled backward.




STABILITY TRIANGLES ON
NARROW-AISLE REACH TRUCKS



**Final Note**

The 'centre of gravity' and "stability triangle" are very technical concepts but their meaning is clear. If you keep your loads within the rated capacity of your vehicle, carry balanced on-centre loads, do not over tilt your upright when in the raised position and drive cautiously, you will have no problems with the 'centre of gravity' or stability triangle'. However, violate any of these four precautions and you are asking to tip over.

## GENERAL SAFETY

### Operating Environment

i. Generally, lift trucks are used for different conditions and lift needs. The type of powered lift truck used will depend on its operational classification (indoor, outdoor, rough-terrain, explosion-proof or narrow-aisle, for example). Hazardous environments require specially designated equipment that will operate safely. For these conditions, some trucks will have UL or FM markings. It is your responsibility to determine the safety requirements of where your forklift will work.

ii. Floor condition is an important part of safe lift truck operation. Floors must be level, free of holes, free o grease or oil, or anything that can cause trucks to skid.

iii. Floor loading is also very important; some machines weigh enough to cause damage to floors.

iv. Before entering a truck/trailer or railway-car assess the conditions and report worn or unsafe surfaces to the supervisor. Make sure that bridge plates or ramps are clean and dry, well supported, sufficiently strong and properly secured to prevent sliding. Rail cars or transport trucks should have their wheels blocked.

v. If pedestrians have to use stacking aisles or work environment, adequate walking space must be provided on one side. Barriers like permanent railings are best, but at least outline the pedestrian walkway with striping. Convex mirrors and traffic control signs should be installed at blind aisle intersections to prevent truck or pedestrian accidents. Keep all aisles clear and don't allow stored materials to extend into the aisle.

vi. Electrical lines, lights, and other utility pipes (water, gas, and air) should be raised as high as possible to reduce chances of trucks hitting them.

vii. Where elevators are used, have your elevators inspected regularly. Load capacities must be posted. Never exceed maximum capacities.

viii. All areas which are enclosed or confined must be well ventilated. This is to remove fumes and gases. Internal combustion powered lift trucks (those using gas , diesel or LPG) all produce carbon monoxide. Carbon monoxide is a colourless, odourless, poisonous gas which can overcome people without warning.

ix. Operators should ensure that they are familiar with the proper application of their fire fighting equipment.

x. Generally, lighting is important in providing a safe environment. A safety professional can help make right decisions.

xi. Exit must be marked and not blocked. If it's a safety exit, make sure the doors are not locked.

### Physical Care

i. Employers are responsible for the proper training required under government regulations. Once trained, operators should be evaluated often to ensure they continue to follow safe material handling best practices.

ii. Where the operator is likely to be exposed to head or foot injury, head and foot protection must be worn at all times.

iii. Hands shall be clean and dry, particularly free from grease or oil.

iv. Keep legs and feet inside the guards or body of truck.
v. Only one person should occupy the drivers' area; passengers are never permitted on an operating forklift (unless where another seat with seatbelt is provided, nor is joyriding allowed with a forklift.
vi. When using man-baskets, only in accordance.

**Lift Truck Condition**

i. Check or ensure that your truck is safe to operate. Inspect fuel leaks, batteries, tires, forks, chains, horn, lights, controls, steering, brakes, limit switches and cleanliness (follow an itemized checklist for daily inspections). Ensure that all guards, enclosures or covers are in place.
ii. Report all defects, leaks, and other physical problems to the supervisor immediately. Only trained and authorized personnel should make adjustments or repairs to lift equipment.

**Getting Started**

i. Look all around before starting to move.
ii. Always look in the direction of travel before moving, particularly when travelling in reverse. This includes the short reverse movement that is required in some instances when turning the truck around in confined spaces.
iii. Watch the swing of the rear of the truck turning corners. An extreme hazard exists when making short radius turns with an elevated load.
iv. Deliberate, attentive action is required at all times. Do Not Hurry.

**Travelling**

i. Raise forks to clear floor 4" (inches), and tilt mast back. Always travel with forks in the lowered position.
ii. Ensure that no passengers ride on the truck, except where a properly designed seat with seatbelt is installed. In this case, ensure that the passenger's seatbelt is fastened.
iii. Maintain a safe speed at all times, i.e., that which will allow stopping within the visible and known clear distance in the direction of travel. Reduce speed on wet or slippery floors; in congested areas; when descending ramps or inclines; when crossing bridge plates; when vision is restricted; when carrying a load or when travelling over uneven surfaces.
iv. All starts, stops or turns should be easy and gradual, particularly when the truck is loaded.
v. Keep to the right when passing. Maintain a distance of three lengths behind another truck going in the same direction.
vi. Slow down and sound horn (short blasts) at cross aisles, doorways, when approaching personnel or other trucks.
vii. Pedestrians must always be given the right-of-way.
viii. Stop railway crossing, elevators, blind corners or whenever vision is obscured.
ix. Do not drive toward anyone standing in front of a fixed object, i.e., a wall or bench.
x. Avoid running over loose objects or holes in floor.

xi. Railway tracks shall be crossed slowly, and when possible, diagonally.
xii. Do not drive into areas containing flammable vapours or explosive dusts unless the truck is approved for use in such locations.
xiii. Allow one-foot clearance between aisle barriers and other trucks.
xiv. When an operator is assigned a truck, he is responsible for seeing that no one other than a qualified operator drives or handles it.

**Loading & Unloading**

i. It is the responsibility of the operator to ensure that a load is properly and neatly stacked and, where applicable, tied down. Keep height down and place heaviest objects nearest the bottom. Round objects should be blocked and tied. It is also the responsibility of the operator to know the capacity and gross weight of his loaded truck. He shall operate and travel only in areas approved for these loads. Weighs shall not be placed on the rear of trucks to increase capacity. Trucks should only be used for purposes, for which they were designed, i.e., do not use for towing or pushing.
ii. Personnel shall not ride on the load or be elevated except when the truck is fitted with a platform designed for this purpose.
iii. Approach the load squarely and centrally and with the forks level, i.e., with the mast vertical. Loads should not be shifted by butting with the trucks. Forks, which are adjustable, shall not be shifted by butting with the truck. Forks, which are adjustable, shall be placed at the out edges of the load. The forks should be placed under the load as far as possible, i.e., the load shall be against the back of the fork carriage. After the load has been picked up, the mast should be tilted backward. Do not travel with load elevated higher than that required to clear the floor.
iv. Travel in reverse if the load is such that vision forward is obstructed.
v. Where possible, approach elevators at an angle and stop 5 feet from the gate before entering with the load in front. Ensure that the capacity of the elevator is adequate. If applicable, wait for the signal from the elevator operator before entering. Personnel, including the elevator operator, should stay off the elevator until the truck has been driven on. Set the brakes ‘on’, set the load on the floor, place controls in neutral, shut-off the power and get off the trunk.
vi. Loads shall always be carried in the lowered position with the mast tilted backward while travelling. Come to a halt at the stack area before elevating the load. If the stack area is not level, the approach must be made from the downhill side and the tuck must be level laterally before the load is raised. Stop at the front of the stack, place controls in neutral and raise the load to stack height, with mast tilted backward. When the loads are above and clear of the stack, move slowly forward until the load I over the stack. Move the mast to the vertical and lower the load to the stack. The mast should not be tilted forward unless the load is directly over the intended place for unloading. Lower forks to clear the load and reverse truck to withdraw forks. When clear of the stack, tilt mast backward and lowers forks about 4” (inches) from the floor level. All tilting, elevating or lowering motions shall be done slowly. It is the responsibility of the operator to avoid the striking of overhead electrical fixtures, valves, sprinkler systems, etc., during high lift operations. Loads should not be stacked closer than 18 inches to sprinkler heads (36 inches if the material is combustible).

vii. Operation on ramps or inclines requires special attention. Brakes should be tested and speed reduced before descending. Where applicable, the correct gear should be used for the load being transported. No person shall be permitted to walk down ramps ahead of the truck. Extreme caution is required when operating near the edges of ramps, docks, etc. the load should always be on the upside of a gradient, i.e., trucks carrying a load should be driven up and backed down. The reverse is to be applied to empty trucks, i.e., backed up and driven down. Turns should not be attempted on inclined surfaces.
viii. It is the responsibility of the operator to ensure that no on stands or walks under an elevated load.

**Parking**
When leaving the truck, operators must be sure that the lift truck is left in a safe position. Operators must follow the following rules:

i. Bring your machine to a complete stop.
ii. Lower the forks or attachment completely. Be sure that the forks are flat on the floor; then tilt the upright forward.
iii. Place the directional lever in neutral.
iv. Apply the parking brake. If your parking brake does not work, be sure you report it and take the machine out of service.
v. Never stop on any type of grade. Get the lift truck to a level surface for parking, out of the way of traffic and emergency equipment.
vi. Never leave your truck parked on a dock, ramp or in a trailer.
vii. If there is any question about a lift truck moving, chock it.
viii. Turn off the power supply, or in trucks where available, turn the master power/ignition switch to the off position. If possible, remove the keys to prevent use of the equipment by unauthorized or unqualified personnel.

**OPERATING PROCEDURES FOR LPG (PROPANE) LIFT TRUCKS**
Please consider the following instructions when operating or using LPG/Propane-Powered Lift Trucks. These instructions should be considered, in addition to the general rules.

i. The principle hazard is the opening of the relief-valve on the fuel container as a result of overfilling or working near high local temperatures. Truck should not be left unattended or stored near intense heat, combustible materials open flames or similar sources of ignition.
ii. Fumes from liquid propane fuel are heavier than air; therefore, leakage from a vehicle, which is parked or stored near an unventilated pit or room at a lower level, is a potential hazard.
iii. The fuel tank shall be securely fastened to the truck. Fuel tanks shall be installed with the relief valve at the top.

iv. The storage, refilling and handling of LPG fuel shall only be done by qualified personnel and in accordance with the Ontario Propane Code, regulation 336/64, issued by the Department of Energy and Resources Management and Canadian Standards Association code B-149. Eye protection should be worn. The refuelling area shall be equipped with a 20 lb. $CO_2$ or a 10lb. gas-pressured dry chemical fire extinguisher.
v. When changing fuel tanks, the fuel supply shall be shut-off and the engine run until all fuel in the system has been used before disconnecting the old tank.
vi. Buildings in which trucks operate shall be ventilated.

**Safe Handling of Liquid Petroleum**

LPG fuel is an efficient and economical motor fuel for use in industrial trucks. However, it is highly flammable and extremely volatile under certain conditions. Failure to follow recommended safety procedures for the handling of the gas could result in serious personal injuries and property damage.

i. Store full and empty cylinders in clearly labelled an segregated areas away from heat fans, blowers, welding shop and other sources of ignition.
ii. Personal protective equipment must be worn while exchanging or refilling cylinders (gloves and eye protection, foot protection).
iii. No smoking within 50 feet of the truck while the cylinder is being removed installed or refilled from a bulk tank.
iv. The engine must be shut-off valve is closed before you loosen any coupling on the fuel line.
v. Check the cylinders for excessive damage. If any appear to be in dangerous condition tag them, remove them from use, and report them to your supervisor.
vi. Make certain the shut-off valve is closed before you loosen any coupling on the fuel line.
vii. Inspect the coupling each time the cylinder is changed, ensure the threads and coupling washer are in good condition. Never connect with a faulty or missing washer.
viii. The pressure relief valve must be at the 12 o'clock position when the cylinder is installed.
ix. Open the valve slightly and check for leaks, if all is in order secure the cylinder with the clamps.
x. Open the valve slowly to restore the fuel supply to the engine; if the valve is opened too quickly, the excess flow valve will cut off the fuel supply.
xi. If the excess flow valve has shut-off the fuel supply, close the main valve, wait a few minutes and reopen the valve slowly.
xii. Never attempt to repair any part of the fuel system, only authorized mechanics must use officially approved components.
xiii. When not in use, trucks must be parked in well-ventilated areas remote from combustible material, the key must be removed and the fuel supply shut-off.
xiv. Full cylinders weight approximately 70lbs. Use proper lifting techniques while handling them.

**Liquefied Petroleum Gas**

A specific area should be designated for the storage and changing of LPG tanks, and 9only trained and authorized personnel shall be permitted to service these tanks). Leaving tanks carelessly around is inviting trouble. A valve leak combined with a spark or careless smoker could ignite the fuel. In addition, hitting a tank with the forks of a truck could cause it to explode. Tanks should not be dropped, thrown or rolled. As with any re-fuelling operation there is absolutely no smoking.

The **four basic steps for removal of an LPG tank** are as follows:

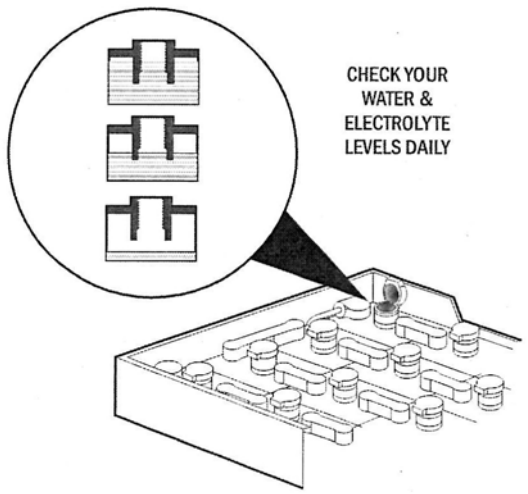
i. Close the valve of the feed line while the engine is running and allow the engine to run until the fuel remaining in the lines is consumed and the engine stalls. I this procedure is not followed, the remaining liquid propane gas in the line can cause second-degree frost burns.
ii. Disconnect the feed line.
iii. Remove the safety bracket and hold down strap.
iv. Remove the cylinder.

The **seven basic steps for installing an LPG tank** are as follow:

i. Check on /off valve to make sure it is closed.
ii. Inspect cylinder for obvious damage and rust corrosion.
iii. Inspect tank flow-control valve to ensure washer is in place.
iv. Install the cylinder on the truck.
v. Secure the safety bracket and hold down the straps.
vi. Connect the fuel line.
vii. Open the valve for the fuel line slowly. Opening this valve too fast may result in a form of vapour lock, which will leave you unable to start the truck.

**OPERATING PROCEDURES FOR ELECTRIC LIFT TRUCKS**

**Industrial Battery Operation: General Instructions**




i. **Topping up.** Check electrolyte level at least once a week. Add only approved water to cells as often as necessary, taking care to cover the plates without overfilling.
ii. **Cleaning.** Keep top of battery clean and dry to avoid possible corrosion of cell tray and terminal posts. A solution of bicarbonate of soda and water can be used to neutralize acid spilled onto cell tops. Ensure that vent plugs are securely in place. Temperature: Battery temperature

must not be allowed to exceed 110°F at any time. Charging or discharging should be suspended at 110°F, and the battery should be allowed to cool, prior to further charge or operation. Adequate ventilation should be ensured during charge.

iii. **Hydrometer checks.** Take hydrometer readings of pilot cells daily and all cells once a week. The specific gravity of the electrolyte in a fully charged battery should be between 1.265 and 1.285 with the cells filled to the correct level. It is recommended that the battery be given an extra charge cycle once a month, or more frequently under heavy service conditions. All hydrometer readings should be recorded.

iv. **Discharge.** The specific gravity of the electrolyte should not go below 1.140 during a work shift. At this point, the battery must be put on charge immediately. It is good practice not to let the specific gravity fall below 1.160-1.170 for longer battery life.

v. **General Precautions.**
   a. Batteries emit explosive gasses; No naked lights or flames allowed in charging areas.
   b. Do not add acid to cells, only approved water.

**Battery Inspection**

i. Check the terminal connection.
ii. Clean the cap and battery surface to prevent foreign material from entering the battery cell.
iii. Check the specific gravity.
iv. Check the electrolyte level in all cells. Add distilled water if necessary.
v. Check electrolyte for impurities.
vi. Check vent-plugs and gaskets for abnormalities.

**Basic Battery maintenance Program**

All batteries should have an individual number, preferably painted on. These numbers with all other battery information would form an inventory and repair record. This would also apply to trucks and chargers.

Initially, all battery's specific gravities should be recorded twice daily before and after the end of each shift. Use a pilot cell on each battery.

**MAINTENANCE CHECKLISTS**

Since a lift truck is so valuable and so vital to the operations of our industry, your lift truck must be properly cared for. To assure efficient operation during the expected length of service, a planned maintenance program is necessary. Most maintenance will be performed by maintenance personnel, but you as an operator will also have specific maintenance duties. Every time you operate your vehicle, you should check/inspect the unit and report items needing maintenance. Planned maintenance keeps equipment running smoothly and helps you do your job properly: potential trouble can be spotted and corrected before it can cause costly repairs. At the start of each shift, make all the checks and inspections listed on the daily inspection report.

Mark off each item as you make your inspection, using a check mark if the individual component is okay and an "X" if you discover something wrong, explain all items needing attention or repair in the "remarks' section. These figures will show whether the chargers are operating correctly and whether it is necessary to charge each battery every night.

KEEP A DAILY MAINTENANCE CHECK OF YOUR UNITS CONDITION

| No. | Monday | | Tuesday | | Wednesday | | Thursday | | Friday | |
|---|---|---|---|---|---|---|---|---|---|---|
| | AM | PM | AM | PM | AM | PM | AM | PM | AM | PM |
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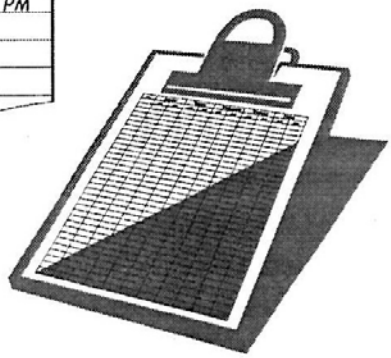


**GAUGES & INSTRUMENTATION: Important Checks**

The following is a synopsis of several important gauges. Please monitor your gauges, for variations in normal operation. Significant changes from the operating norm should be noted and examines, immediately.

i. **Oil Pressure.** This gauge is designed to indicate to the operator if the engine is being lubricated efficiently, in order to give optimum engine life. Oil, like any other fluid, will solidify or become very difficult for the oil pump to distribute to all working parts in this condition. Therefore, in cold temperatures (weather) a high-pressure reading would be normal. As the temperature in the engine increases, the oil becomes thinner and therefore the oil pressure will drop to a normal reading as indicated in the manufacturer's manual. Low readings could be caused by lack of oil, worn out engines, pump not operating correctly, etc.

**ii.** **Water Temperature Gauge.** This gauge will indicate to the operator the temperature of the water in the cooling system. When truck is first started, a low reading would be expected, as the emgine heats up the water temperature should increase also to a normal reading. If machine overheats, the possible causes are a lack of water, a faulty pump, loose or broken belts, or a non-operational thermostat.

**iii.** **Ammeter Gauge.** This gauge indicates if the battery is being charged or discharged. The three main components are: the battery, alternator and regulator. If the gauge show a discharge possible causes would be: a faulty alternator or shorts in the circuitry. If overcharging, a faulty regulator may be responsible, or the gauges should be checked for accuracy.

**iv.** **Hour Metre Gauge.** Mainly used for maintenance purposes indicating when the machine should be serviced, sometimes used on electric machines to indicate when the battery should be placed on charge.

**TRAVELLING**

The principles expressed in this section may appear to be very basic but should not be taken lightly: every year operators lose their lives operating fork lifts inaccurately. Drive carefully and take the time to observe the rules. At the end of a day, you will probably be more productive than the hot rod driver who is gambling with his life as well as the lives of his fellow workers.

i. The load should be kept as low as possible when travelling.
ii. The mast should be tilted fully backward.
iii. When carrying a load, the truck should be driven forward on upgrades and backed down on down grades.
iv. Without a load, they should be backed up and driven down the grade.
v. The operator should maintain clear visibility in the direction of travel.
vi. The horn should be sounded at cross aisles or blind corners, or whenever vision is impaired.
vii. If the load blocks the operator's view, he should travel in reverse. This is called trailing the load.
viii. The operator should always try to find a six-inch clearance from overhead obstructions.
ix. Railroad tracks should always be crossed at an angle.
x. The rules of the road must always be obeyed.
xi. Pedestrians should be given the right of way. Trucks should always be driven on the right side of the aisle and three truck lengths behind the truck ahead of it.
xii. Slow operation is necessary on wet or slippery floors.

**RAMPS & DOCK AREAS**

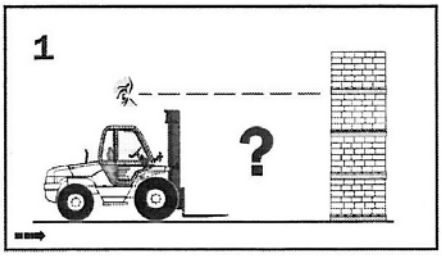
Before attempting to load or unload a truck or trailer, check the dock condition to make sure it is adequate for the truck you are driving. Also check the dock board for its capacity, condition, and anchoring. Never use a steel plate as a substitute for an approved dock board. In addition, make sure the wheels of the truck or trailers are blocked. The trailer door opening must be high enough to allow your upright and overhead guard to pass under it clearly. If you are going to double stack loads in a low ceiling area such as a trailer, you may need a free lift type upright. Raise your forks slowly and check the clearance.

Whenever you have to negotiate a ramp or grade when carrying a load, the load should be facing up the grade. Never make a turn on a ramp grade since it invites a forklift tip-over. Finally, when you park your vehicle, try to find a level area, set the parking brake, lower the forks to the ground, shut-off the power and remove the key.

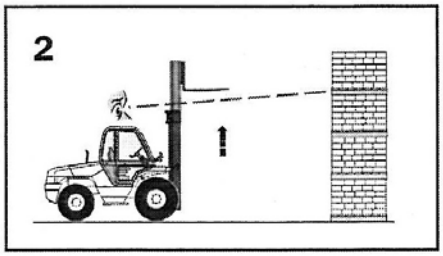
All of the principles thus far mentioned apply equally to both solid/cushion and pneumatic tired trucks. The outside operator should pay particular attention to uneven ground, potholes, railroad tracks, grades and angles. Often the outside operator will be handling very wide loads such as lumber or steel.

**APPENDIX A: Safe Lift Truck Operation**

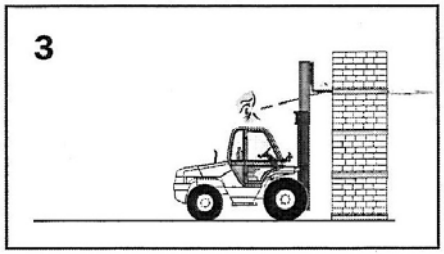
The following chart is to provide the novice user with a basic understanding of how to pick-up, load, transport and unload with a lift truck. It is not a complete reference: this guide should not replace a training session, tutorials or government-mandated program. This reference does not consider differing environments and specific conditions; if these points are critical please consult sales representative or rental manager.



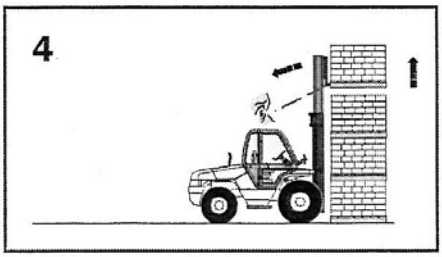

Halt at the face of stack and apply brakes. Bring the mast to the vertical position. If necessary, adjust the fork-spread to suit the width of the load. Ensure that the weight of the load is within the truck capacity.



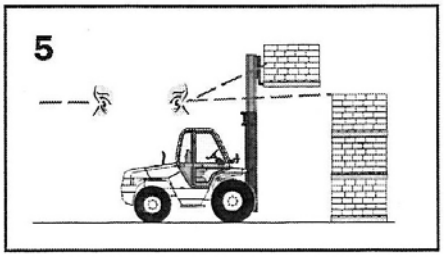

Raise forks to a position permitting clear entry into pallet.



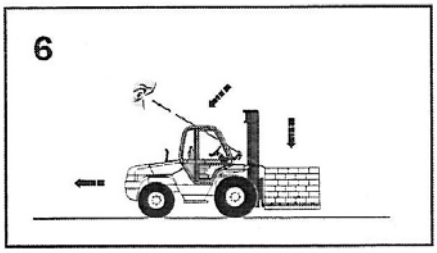

Fully insert forks by slowly driving forward and apply brakes.



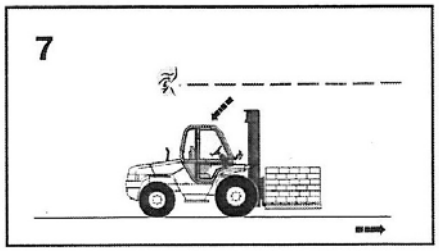

Lift load clear of stack and carefully apply backward tilt just sufficient to stabilize the load.



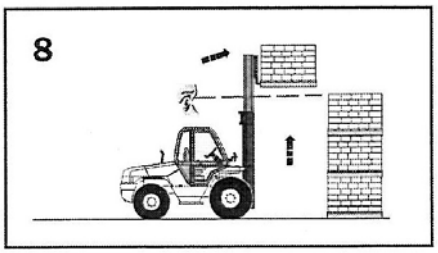

When the load is clear of the top of the stack, check that the way is clear of the face of the stack, taking care not to dislodge loads in adjacent stacks, and apply brakes.



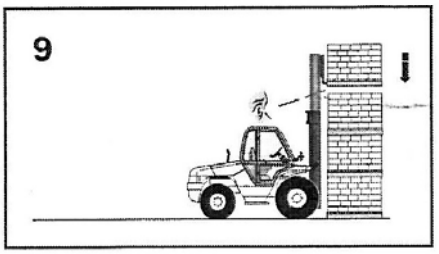

Lower the load carefully and smoothly to the correct travelling position, applying further backward tilt before moving off.




Approach the stack with the load low and tilted backwards.

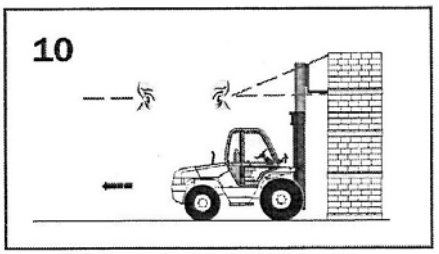



Slow down and stop at the face of the stack, apply the brakes and reduce backward tilt and amount just sufficient to stabilize the load. Raise the load to the desired stacking height.

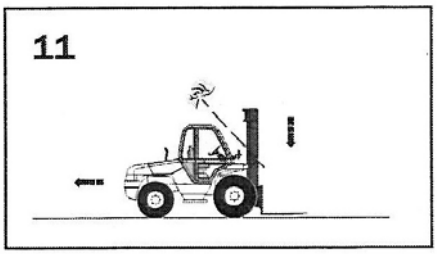



When the load is clear of the stack top, move slowly forwards, taking care not to dislodge loads in adjacent stacks.

When the load is over the stack, stop, apply brakes, and bring the mast to the vertical position and lower the load onto the stack.




When the load is secure, lower forks until free of pallet or dunnage strips. Ensuring the way is clear, withdraw by reversing the truck. At this position slight forward tilt may be of assistance, otherwise it should seldom be necessary to use forward tilt.




When clear of stack, apply brakes, tilt forks backwards and lower them, to just above the ground level, before moving off.

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