KOMATSU

SHOP MANUAL

HYBRID ELECTRIC LIFT TRUCK

BE30 HYBRID Series

Applicable Model	Serial No.
FB20HB-11	M254-817001 and up
FB25HB-11	M254-817001 and up

SECTION INDEX

00. FOREWORD

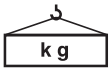
1. This Shop Manual mainly is composed to be mainly for the lift trucks equipped with the battery hybrid system of FB20/30-11 (BE30 Series).
   For the items not covered in this Shop Manual, see the applicable sections in the already published Shop Manual "BBB11E1-02".
2. This manual describes the correct procedure for inspection, maintenance and troubleshooting in order to maintain the performance of lift trucks and secure workers' safety. Workers are expected to read this newly published Shop Manual "BHB11E1-02" along with the already published Shop Manual "BBB11E1-02" to offer quality service. When the sales-related specifications or other data are needed, refer to the Sales Manual.

PRECAUTIONS WHEN PERFORMING THE SERVICE WORK

Always pay attention to "Safety" before starting any work -- this is important. Never attempt any work where danger to yourself or to other persons. Whenever work requiring safety precautions are described in this manual, a flag mark ⚠ inserted, always make double sure that safety measures are taken. Other unmarked work, should always be performed after studying and using your common sense to prevent accidents.

DESCRIPTION OF THE SYMBOLS

The symbols described below are used in this manual for convenience and better understanding.

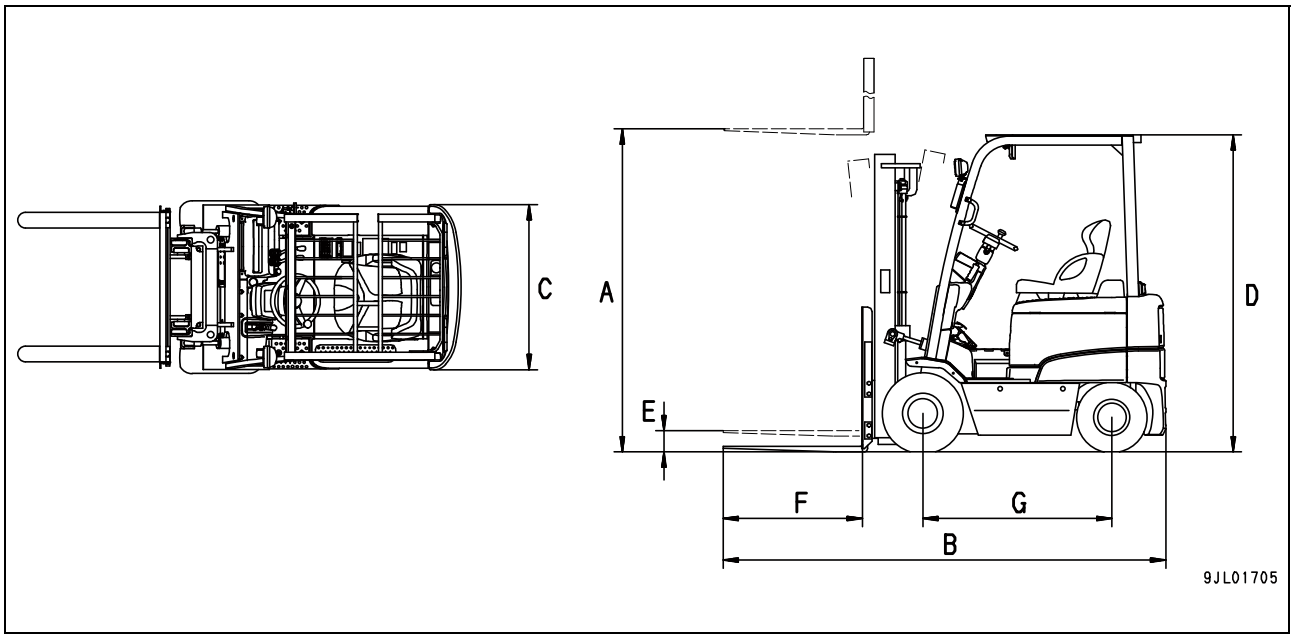
Symbol	Item	Description
	Safety	Special safety precautions are needed to perform the work.
★	Note	Special technical precautions are needed to perform the work.
	Tightening torque	Fastening parts that require specified tightening force when assembling.
	Weight	Weight of parts or systems
	Coat	Places to be coated with adhesives, etc. when assembling
	Drain	Indicates the drain port of oil and the like, and the volume of drainage.

10. GENERAL AND SPECIFICATIONS

For the items marked with *, see Shop Manual "BBB11E1-02", "GENERAL AND SPECIFICATIONS".

■ OUTSIDE VIEW AND SPECIFICATIONS

Item			Unit	FB20HB-11	FB25HB-11
Max. Load			kg	2000	2500
Load Center			mm	500	500
Max. Lifting Height		A	mm	3000	3000
Lifting Speed (Loaded)			mm/s	290	260
Travel Speed (Unloaded)			km/h	16.5	16
Max. Gradeability (Loaded)			% (°)	19.0 (11.0)	16.0 (9.0)
Overall Length (Up to Fork End)		B	mm	3175	3365
Overall Width		C	mm	1165	1165
Overall Height	Mast Height, Lowered		mm	1995	1995
	Height, Overhead Guard	D	mm	2095	2095
Std. Free Lift		E	mm	150	155
Length, with Std. Forks		F	mm	920	1070
Wheelbase		G	mm	1400	1400
Service Weight (with Battery)			kg	3630	3960
Motor Output	For Travel		kW/h	AC 10.3	AC 10.3
	For hyDraulic Equipment		kW/5min	DC 10.0	DC 10.0
	For Power Steering		kW/h	DC 0.6	DC 0.6
Tyre Size	Front		–	23 x 9-10-16PR	23 x 9-10-16PR
	Rear		–	18 x 7-8-14PR	18 x 7-8-14PR
Battery Capacity			Ah/5h	480	
Battery Charger Power Source	Input Current		A	51.8/51.8 (50 Hz/60 Hz)	
	Input Voltage		V	190 – 219	
	Max. Input Power		kVA	18.0/18.0 (50 Hz/60 Hz)	



⚠ HANDLING OF BATTERY

- This lift truck (equipped with the hybrid system) has 2 power supply systems of capacitor and battery. A special discharger is required to turn OFF all the power supplies.
- Since every battery handling operation is important for safety, fully understand the precautions on environment, fire, electrical shock, and battery electrolyte, actions against abnormality, storage and disposal of the battery.
- You must understand the hazardous nature involved in handling the battery since its inappropriate handling can lead to explosions, damages of property and personal injuries.

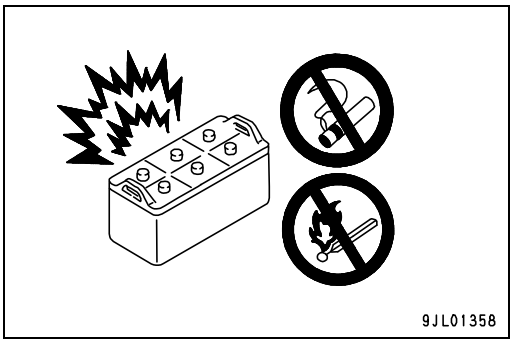
ENVIRONMENT AND CONDITION

- Use the battery within the following temperature ranges. Failing to do so can cause breakage or deformation of the battery.
  During discharging (operation): -20 – 50 °C
  During charging: 0 – 40 °C
  During storage: -20 – 40 °C
- Do not expose the battery to water or marine water. Otherwise, corrosion of the battery, electric shock or fire may result.
- Do not use or store the battery in places where it will be exposed to strong direct sunlight, in the front of a stove, or near fire. If the battery is used or stored in these places, it may leak electrolyte, heat, or burst.
- Do not use the battery in a dusty place. In a dust place, the battery terminals may be shorted. If it is obliged to use the battery in a dusty place, check it periodically.
- Do not drop the battery or give a strong impact to it. A strong impact can break the battery case and lower the battery performance.
- Do not bring a wire cover containing plasticizer or a soft vinyl chloride sheet in contact with the battery. And do not bring an organic solvent such as paint thinner, gasoline, kerosene and benzine or liquid detergent in contact with the battery. If these liquids are brought in contact with the battery case, the case may crack and electrolyte may leak.
- Do not cover the battery with a vinyl sheet, etc. that can generate static electricity. Static electricity can cause an explosion.

CAUTION ON INSPECTION

- Check the appearance of the battery. If its case or cover is cracked or deformed or if electrolyte is leaking, replace it with a new one.1 If the battery having external abnormality is used as it is, the specified output may not be obtained and electrical leak, smoking, ignition, and other accidents may occur.
- If the charge voltage or discharge characteristics of the battery are abnormal, replace the battery with new one.
- Always charge the battery by the method described in the Operation and Maintenance Manual. If the battery is charged by another method, the battery may leak the electrolyte, heat or burst. If charging is not finished in the shown charge time, stop charging immediately.
- Do not open the battery seal or supply water. Doing so can cause an electrolyte leak or an explosion.
- Do not use the battery with its wiring loosened. Doing so can cause ignition.
- When the battery is used in cold weather, charge it immediately after each use. Otherwise, the battery may be broken due to freeze.
- Be sure to turn off the lift track's starting switch after using the battery. Otherwise, the battery is over discharged and its performance and service life decrease.

CAUTION AGAINST FIRE



- Although the battery used on this lift track is sealed, it can generate flammable hydrogen gas depending on the given state of charging. It is, therefore, prohibited to smoke a cigarette or use fire near the battery.
- Do not place a metallic body such as a tool and part on the battery since such can induced explosion being ignited by sparks.
- To clean the top surface of battery, wipe with wet cloth before recharging. Using dry cloth for wiping, dusting or covering battery with vinyl sheeting generates statistics that may cause explosion.
- Depending on the weather, environmental, clothing material and other conditions, human bodies may deposit and spark statistics. Therefore, before touching truck in charging or after charging, discharge statistic deposit in the human bodies by grounding.

CAUTION AGAINST LEAKAGE AND ELECTRIC SHOCK

- In precaution against leakage of electricity, always keep the top surfaces of batteries clean and dry.
- Batteries for battery-driven trucks store large energy in high-tension. Beware of the risk of electric shock. Never allow human body to touch conductive portions during maintenance and inspection service.
- Always wear protective glasses, rubber gloves and rubber sole shoes for working on batteries. (they also help protect you from direct contact with diluted sulfuric acid).

CAUTIONS AGAINST BATTERY ELECTROLYTE

- Battery electrolyte contains diluted sulphuric acid, which may cause burns and loss of eyesight. If you spill battery electrolyte on yourself, immediately take off your clothes and flush the contacted portion of your skin with a large quantity of tap water, and then consult a doctor.
- If battery electrolyte gets into your eyes, flush them immediately with fresh tap water for 10 to 15 minutes continuously and consult a doctor.
- If you drink battery electrolyte by accident, either drink a large quantity of water or milk mixed with beaten egg white or salad oil, and then consult a doctor at once.
- Spilling or leaking battery electrolyte in the surrounding area damage the floor and material, leading to environmental contamination. If contacted by human beings, it may cause burns or injuries. Immediately neutralize battery electrolyte with an acid neutralizing agent (baking soda, calcium hydroxide or sodium carbonate, etc.) and wash it down with large amount of water.

ACTION FOR ABNORMALITIES

- Do not drain battery electrolyte, disassemble or repair the battery, which may cause explosion and/or electric shock.
- If corrosion of the battery terminal, leakage of the electrolyte, and deformation of the battery case are found , do not use it. If the abnormal battery is used as it is, it may heat and explode.
- If sulfuric acid is attached to the lift truck, wipe it off using a piece of rag and then wash with water. If the sulphuric acid is left as it is, it can cause corrosion.
- If the following abnormalities are detected, implement the applicable inspection and maintenance operation.

If battery plug and charging plug mating become loosened or play is generated (plug is abnormally heated)
Battery electrolyte temperature is high.
Battery makes abnormal sounds or emits odor.
Charging requires too long time. (Charging is not completed although the battery was not used till late hours on the preceding day.)