FORKLIFT

SERVICE MANUAL

HBF15T-5

HYUNDAI

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(3) Performance and maintenance of batteries

① Initial charge

Dry-charged battery gradually decrease its capacity during storage. In order to provide sufficient discharge capacity in the first discharge, the good initial charge is required. The conditions of initial charging are seen as below at room temperature.

a. By modified constant voltage charger

Connect the battery to the charger and turn on the equalizing charge "ON". The battery will be fully charged and terminated automatically.

b. By constant voltage constant current charger

Connect the battery to the charger and turn on the equalizing charge "ON". The battery will be fully charged and terminated automatically.

c. By constant current charger

Connect the charger to the battery and charge the battery by 0.1C×5 hour rate nominal capacity current for 24 hours or more. The charge shall be terminated when one of the following condition is identified.

- When a constant value is indicated for more than 1 hour after the battery voltage has reached the maximum value.
- When more than 1 hour of charge is continued after the electrolyte specific gravity has risen fully and becomes constant.

② Discharge and capacity

The capacity of batteries is indicated at 5 hour rate capacity which means the battery can be discharged for 5 hours with the discharge current calculated by dividing the capacity value by 5 until the unit cell mean voltage reaches down to 1.7V at the electrolyte temperature of 30° C.

That is, the capacity is indicated by AH(ampere hour) being calculated as the product of ampere(A) and time(H). However, even in the same type of batteries, the capacity varies with the discharge conditions(discharge current, battery temperature and specific gravity of electrolyte) Even if the batteries discharged its full capacity, if immediately charged to full, there will be no harmful effects remained. Ideal charging amount(AH) is 110-125% of the amount of previous discharge.

③ Specific gravity of electrolyte

Specific gravity of electrolyte drops at discharge and rises at charge. When the batteries are fully charged, it becomes almost constant and shows no further rise. The specific gravity value varies with the change in temperature. Therefore specific gravity measurement should be made with temperature of electrolyte at the same so the measured specific gravity value could be corrected to that at the standard temperature of 25°C by the following formula.

$$S_{25} = S_t + 0.0007(t-25)$$

Where, S_{25} : Specific gravity at 25°C
S_t : Actually measured specific gravity at t °C
t : Electrolyte temperature (°C)

The standard specific gravity for this type of battery is 1.280±0.01(25°C) at full charge condition.
If the electrolyte is decreased naturally while using, distilled water shall be replenished up to the specified level. (Never refill sulfuric acid)
Only when large quantity of electrolyte is lost due to spillage, etc., dilute sulfuric acid specified in gravity shall be added.

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6) CONTROLLER WIRING AND CONNECTIONS

(1) Wiring

① Power connections

See power wiring diagrams for specific connections.

② Power wiring

Minimum cable sizes : Current limits up to 500A 35mm² and 650A 50mm² for SERIES.
Current limits up to 270A 25mm² and 500A 35mm² for SEM.

③ Fuse ratings

Maximum fuse ratings : current limits up to 300A 325A (SERIES), 180A, 125A(SEM)
(Air break) 450A 500A (SERIES), 270A, 175A(SEM)
650A 700A (SERIES), 350A, 250A(SEM)
500A, 325A(SEM)

(2) Light wiring connections

The following section details the connectors on the minimum, medium and high logics. The minimum logic has 2 connectors, 1 for the vehicle/contactor connections and 1 for serial communications. The medium I/O logic has 3 connectors, 1 for the vehicle connections, 1 for the contactor connections and 1 for serial communications. The high I/O logic also has 3 connectors in total, 1 for the vehicle connections, 1 for the contactor connections, and 1 for serial communications.

Pin No	Vehicle connector socket B Traction Med. I/O Logic. 12 way molex connector 8 Digital i/ps 2 Analog i/ps 1+12V O/P.	Vehicle and panel connector socket B Pump low I/O logic 12 way molex connector 6 Digital i/ps 2 Analog i/ps No contactor drives	POWERPAK SEM vehicle & panel connector socket B 12 way molex connector. 6 digital i/ps 2 analog i/ps 2 contactor drives
1	Key sw	Key sw	Key sw
2	Fwd sw	Pump sw 3(TILT)	Fwd sw
3	Rev sw	Pump sw 4(OPTION)	Rev sw
4	FS1 sw	-	FS1/Belly sw
5	Seat sw	-	Seat/Tiller sw
6	-	-	Digital pin 6
7	-	-	Digital pin 7
8	Handbrake	-	Line contactor O/P
9	Footbrake	-	P.Steer/Pump/Brake/Remote LED O/P
10	Motor temp sensor	Motor temp sensor	Analogue I/P 0V - 5V
11	Accel	Accel 3V5-0V(Pump sw1)	Analogue I/P 3V5 - 0V
12	+12V O/P	+12V O/P	+12V O/P

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GROUP 2 OPERATIONAL CHECKS AND TROUBLESHOOTING

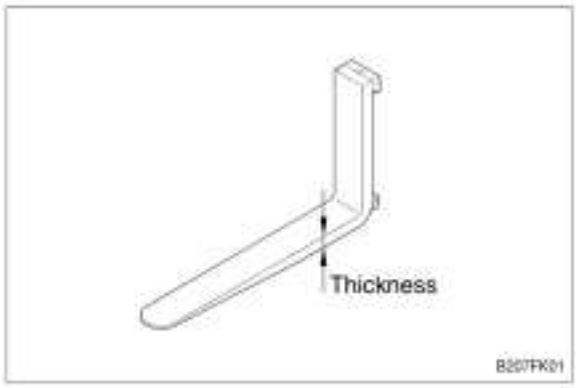
1. OPERATIONAL CHECKS

1) FORKS

(1) Measure thickness of root of forks and check that it is more than specified value.
EX : ℓ =900mm(35.4in)

mm(in)

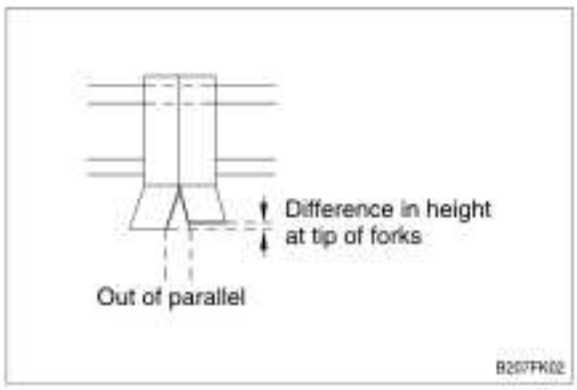
STD Fork assy	Applicable model	Standard	Limit
64FD-11010	HBF15/18T-5	53(2.1)	48(1.9)



(2) Set forks in middle and measure out of parallel and difference in height at the top of forks.

mm(in)

Difference in height	15(0.6)
Out-of-parallel	35(1.4)



(3) Most force is concentrated at root of fork and at hook, so use crack detection method to check cracks.

2. MAST

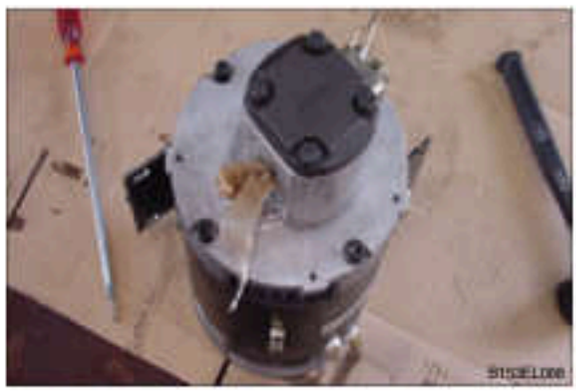
1) Check for cracks at mast stay, tilt cylinder bracket, guide bar, fork carriage and roller shaft weld. Check visually or use crack detection method. Repair any abnormality.
2) Set mast vertical, raise forks about 10cm from ground and check front-to-rear clearance and left-to-right clearance between inner mast and fork carriage, and between outer mast and inner mast. Use these figures to judge if there is any play at roller or rail.
   - Front-to-rear clearance : Within 2.0mm(0.08in)
   - Left-to-right clearance : Within 2.5mm (0.10in)
3) Check that there is an oil groove in bushing at mast support.
4) Set mast vertical, raise forks about 10cm from ground, and push center of lift chain with finger to check for difference in tension.
   If there is any difference in tension, adjust chain stopper bolt.
5) Check visually for abnormalities at thread of chain anchor bolt, and at contact surface between chain wheel and chain.
   Rotate chain wheel by hand and check for any play of bearing.

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(6) Remove 4 bolts on the drive side endbell, using L wrench.



(7) Remove armature and drive side endbell by lifting up straightly. (below)



Armature assembly and drive side endbell.





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2. MAIN CONTROL VALVE

1) DISASSEMBLY

(1) Remove spool cap.

※ **Put disassembled parts orderly on the clean work bench.**



B207CVD01

(2) Remove socket bolts from the opposite side.



B207CVD02

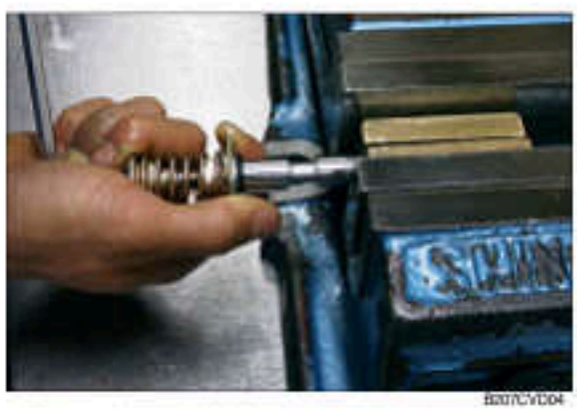
(3) Disassemble spool assembly carefully from the section body.
In case of not being pulled out easily, push it into body again and then pull out smoothly by rotating the assembly.



B207CVD03

(4) Vise a spool assembly, using a jig.
Untighten special bolts and then remove spring seat, spring, seal plate, O-ring and dust wiper.

※ **Put disassembled parts orderly on the clean work bench.**

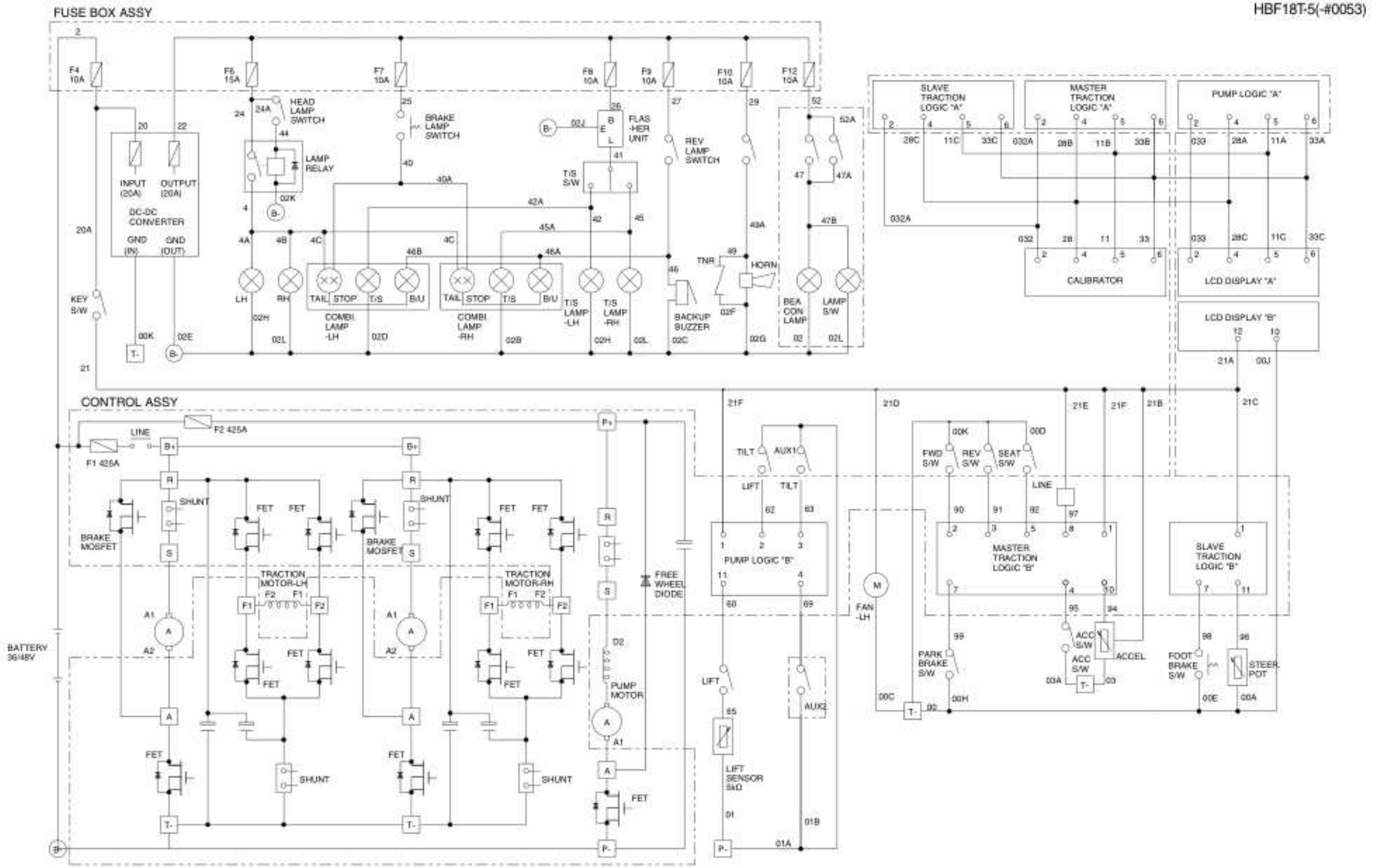


B207CVD04

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GROUP 2 ELECTRICAL CIRCUIT

HBF15T-5(-#0027)
HBF18T-5(-#0053)



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