SERVICE REPAIR

MANUAL

Hyster A373 (C60ZHD, C80ZHD) Forklift

HYSTER

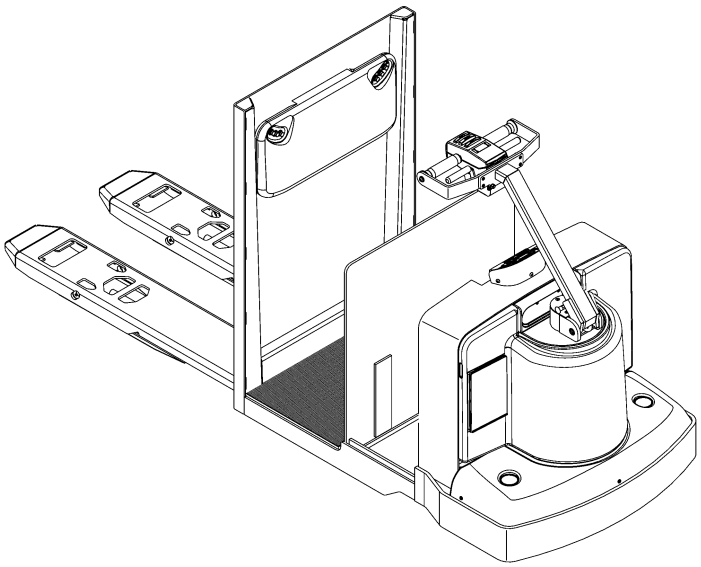
ELECTRICAL SYSTEM

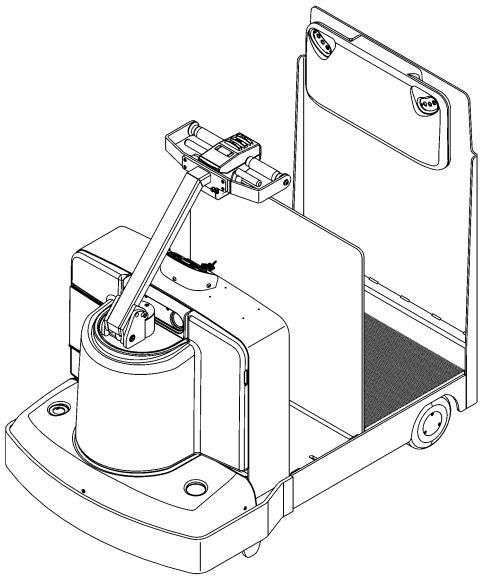
$C80Z_{HD}$ [A282];

$C60Z_{HD}$ [A373];

$T5Z_{AC}$ [C476/D476];

$T7Z_{AC}$ [C477]





HYSTER

PART NO. 4096001

2200 SRM 1632

SAFETY PRECAUTIONS
MAINTENANCE AND REPAIR

- The Service Manuals are updated on a regular basis, but may not reflect recent design changes to the product. Updated technical service information may be available from your local authorized Hyster® dealer. Service Manuals provide general guidelines for maintenance and service and are intended for use by trained and experienced technicians. Failure to properly maintain equipment or to follow instructions contained in the Service Manual could result in damage to the products, personal injury, property damage or death.
- When lifting parts or assemblies, make sure all slings, chains, or cables are correctly fastened, and that the load being lifted is balanced. Make sure the crane, cables, and chains have the capacity to support the weight of the load.
- Do not lift heavy parts by hand, use a lifting mechanism.
- Wear safety glasses.
- DISCONNECT THE BATTERY CONNECTOR before doing any maintenance or repair on electric lift trucks. Disconnect the battery ground cable on internal combustion lift trucks.
- Always use correct blocks to prevent the unit from rolling or falling. See HOW TO PUT THE LIFT TRUCK ON BLOCKS in the Operating Manual or the Periodic Maintenance section.
- Keep the unit clean and the working area clean and orderly.
- Use the correct tools for the job.
- Keep the tools clean and in good condition.
- Always use HYSTER APPROVED parts when making repairs. Replacement parts must meet or exceed the specifications of the original equipment manufacturer.
- Make sure all nuts, bolts, snap rings, and other fastening devices are removed before using force to remove parts.
- Always fasten a DO NOT OPERATE tag to the controls of the unit when making repairs, or if the unit needs repairs.
- Be sure to follow the WARNING and CAUTION notes in the instructions.
- Gasoline, Liquid Petroleum Gas (LPG), Compressed Natural Gas (CNG), and Diesel fuel are flammable. Be sure to follow the necessary safety precautions when handling these fuels and when working on these fuel systems.
- Batteries generate flammable gas when they are being charged. Keep fire and sparks away from the area. Make sure the area is well ventilated.

NOTE: The following symbols and words indicate safety information in this manual:

WARNING

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury and property damage.

On the lift truck, the WARNING symbol and word are on orange background. The CAUTION symbol and word are on yellow background.

TABLE OF CONTENTS

©2016 HYSTER COMPANY

Thanks very much for your reading,

Want to get more information,

Please click here, Then get the complete manual

JustClickHere

NOTE:

If there is no response to click on the link above, please download the PDF document first, and then click on it.

Have any questions please write to me:
admin@servicemanualperfect.com

TABLE OF CONTENTS (Continued)

This section is for the following models:

(C80ZHD) [A282];
(C60ZHD) [A373];
(T5ZAC) [C476/D476];
(T7ZAC) [C477]

General

This section includes removal, disassembly, checks, adjustments, assembly, installation, and troubleshooting procedures for the electrical system components on the T5-7Z^{AC} and C60-80Z^{HD} truck models. Components covered in other sections, such as motors and industrial batteries, are not included in this section.

See the section Controller Diagnostics 9000SRM1657 for additional information on the AC motor controller and for information on troubleshooting fault codes, adjusting parameters, and testing the motor controller.

See the section AC Motor Repair *(With EPAS) 0620SRM1283 for general information on traction motor troubleshooting and repair for lift truck models:

- T5-T7$_{AC}$

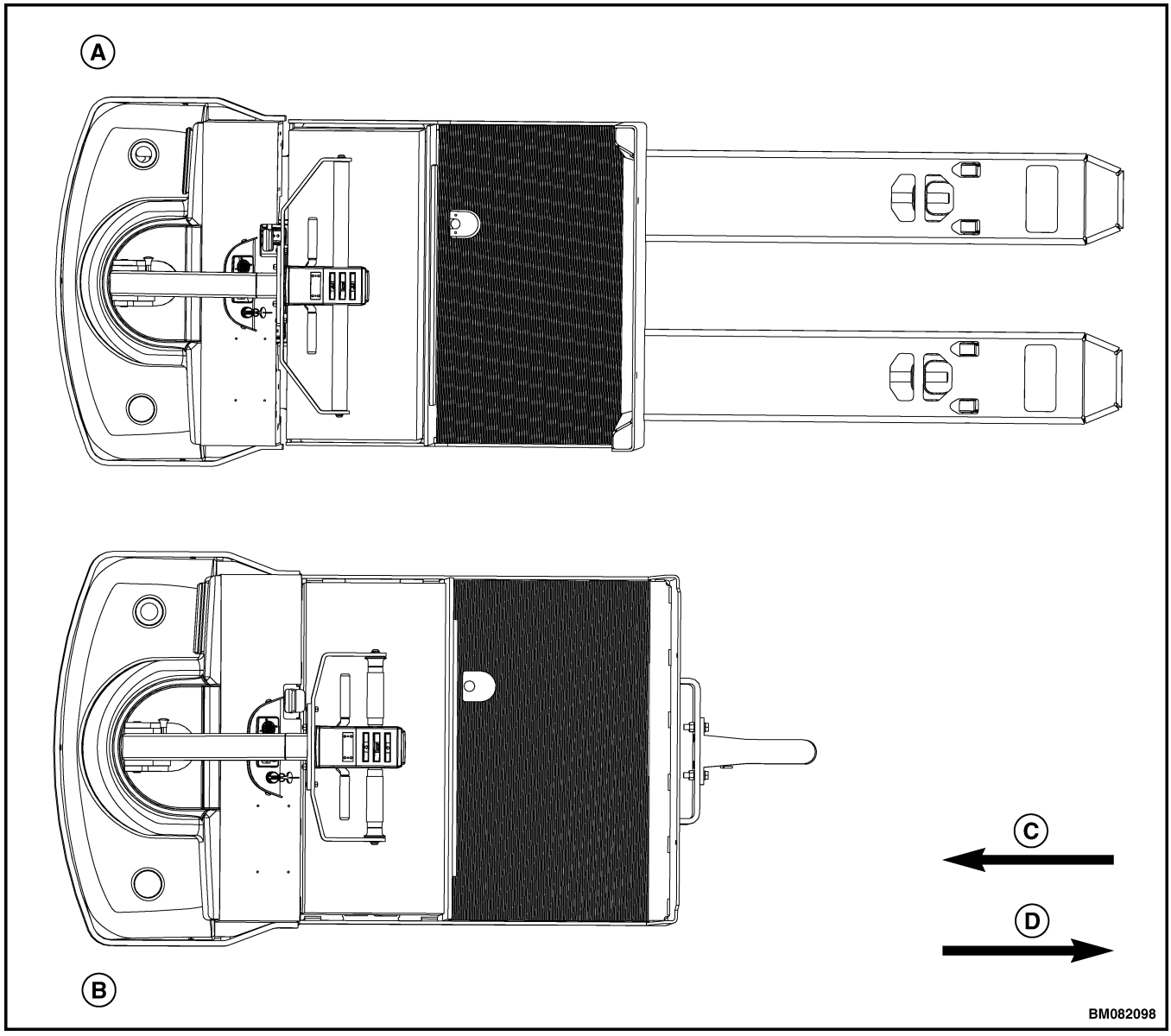
See the section A/C Motor Repair S/N A169N03000L=> S/N A185N03000L=> S/N H118N03000L=> S/N E174N03000L=> 0620SRM1621 for general information on traction motor troubleshooting and repair for lift truck models:

- C60-80Z$_{HD}$

See the section Periodic Maintenance 8000SRM1635 for instructions on removing and installing the drive unit compartment covers and for minimum motor brush length specifications.

See the section Diagrams 8000SRM1634 for the wiring diagrams and schematics.

Throughout this section the terms right, left, front, rear, forward, and reverse relate to the viewpoint of an operator riding on the truck with the forks trailing. See Figure 1.



A. RH SIDE
B. LH SIDE
C. FORWARD
D. REVERSE

Figure 1. Truck Orientation

Description of Operation

This section includes information on the following components:

- Control Handle Switches
- Hall Effect Directional/Speed Control
- Key Switch
- Parking Brake Switch
- High Speed Switch
- Hand Brake Assembly (Brake and Regen Switches)
- Battery Discharge Indicator/Hourmeter (BDI)
- Fuses

- Control Module
- AC Motor Controller
- Brake Coil
- Drive Motor
- Lift Pump Motor (C60-80Z^{HD})
- Contactor

ON/OFF switches are used for:

- Key Switch
- Lift and Lower Functions (C60-80Z^{HD})
- Horn
- Fast Speed (Foot Switch)
- Brake and Regen Switches
- Throttle Neutral Signal
- Parking Brake

A directional/throttle control, neutral switches, and push-button function switches are housed in the control handle.

The Hall effect throttle control is used to provide a directional/speed signal. The neutral switches verify the throttle is in neutral position during the self-check at startup. The horn switch (and lift and lower switches on the C60-80Z^{HD}) are mounted in the top cover of the control handle. These switches send signals to the controller activating each individual function.

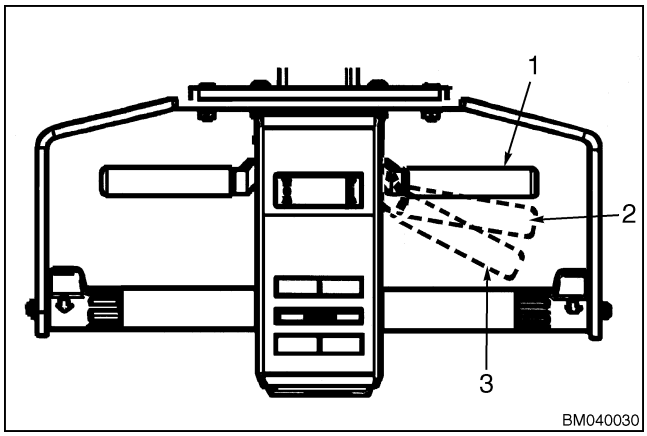
The control module converts analog signals from the control handle to digital signals for the controller to read.

The main contactor opens to remove power from the traction and lift circuits in the event of an electric failure.

A spring applied/electrically released brake is mounted to the top of the traction motor. When the key switch is in the ON position and the parking brake switch is in the OFF position, the brake coil energizes, disengaging the brake. This pulls the brake pressure plate away from the friction disc allowing the drive motor to turn freely.

A two-stage hand brake assembly (see Figure 2) is mounted just below the control handle. The hand brake assembly consists of two independent hand levers, various linkages, and three switches to perform two different braking functions. When both levers are released (Position One), no braking is applied. If either hand lever is placed in the second position, the controller places the traction motor into regen mode.

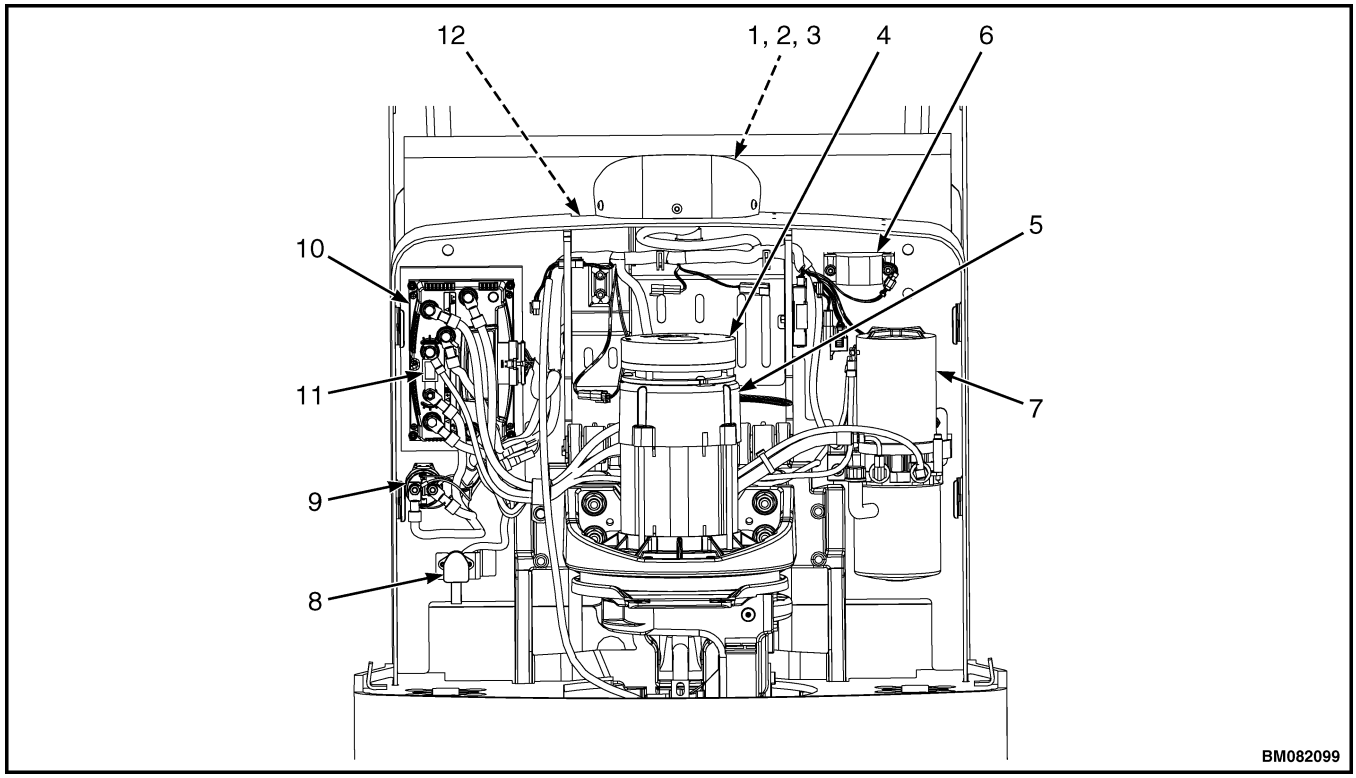
The brake coil releases the pressure plate mechanically engaging the brake when either hand lever is placed in the third position, the parking brake switch is in the ON position, or when the key switch is in the OFF position.



1. BRAKES DISENGAGED (POSITION ONE)
2. REGENERATIVE BRAKING (POSITION TWO)
3. MECHANICAL BRAKING (POSITION THREE)

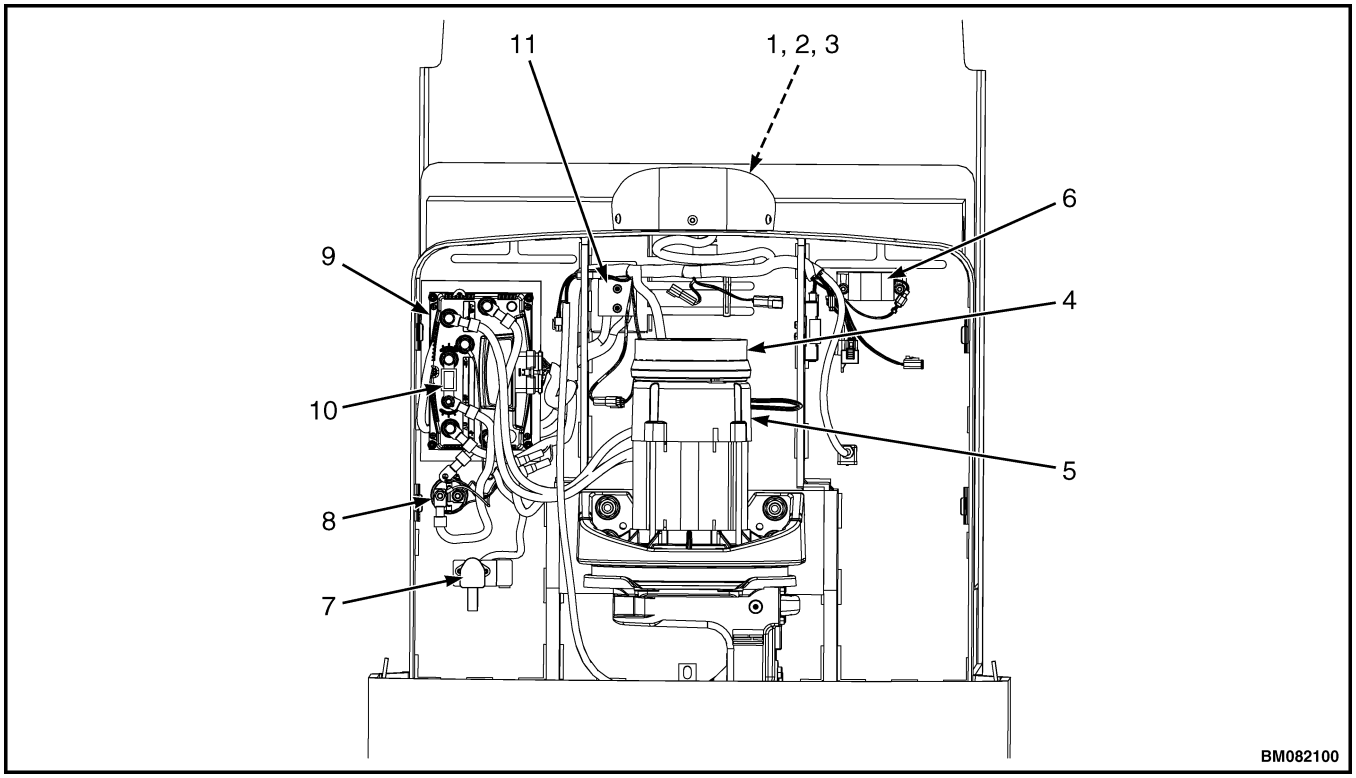
Figure 2. Hand Brake Position

On the C60-80Z^{HD} trucks, the motor controller energizes the lift pump motor when the lift button is depressed. The motor controller activates the solenoid coil opening the lowering valve (located at the pump), when the lower switch is depressed. Refer to Figure 3 or Figure 4. The controller protects the lift pump and motor assembly, eliminating the need for a height limit switch. The controller will stop the lift pump motor 0.6-0.8 seconds after current flow to the lift pump motor exceeds the preset limit. This occurs when the lift truck has reached the maximum lift height, when lifting more than the specified load capacity, or if an electrical fault occurs. The controller will interrupt power to the lift pump motor immediately and resets when the lift button is released.



1. KEY SWITCH
2. BATTERY DISCHARGE INDICATOR (BDI)
3. PARKING BRAKE SWITCH
4. PARKING BRAKE
5. TRACTION MOTOR
6. HORN
7. LIFT PUMP MOTOR
8. DIAGNOSTIC CONNECTOR
9. CONTACTOR
10. CONTROLLER
11. FUSE
12. BATTERY CONNECTOR

Figure 3. Electrical Components (C60-80Z^{HD})



1. KEY SWITCH
2. BATTERY DISCHARGE INDICATOR (BDI)
3. PARKING BRAKE SWITCH
4. PARKING BRAKE
5. TRACTION MOTOR
6. HORN
7. DIAGNOSTIC CONNECTOR
8. CONTACTOR
9. CONTROLLER
10. FUSE
11. BATTERY CONNECTOR

Figure 4. Electrical Components (T5-7Z^{AC})

Special Precautions

DISCHARGING THE CAPACITORS

WARNING

The capacitor in the transistor controller can hold an electrical charge after the battery is disconnected. To prevent electrical shock and personal injury, discharge the capacitor before inspecting or repairing any component. Wear safety glasses. Make certain the battery has been disconnected. DO NOT use a screwdriver to discharge the traction motor controller.

WARNING

To avoid personal injury and prevent electrical shock, perform the following steps before performing any troubleshooting or adjustments, and connecting or disconnecting a handset or PC.

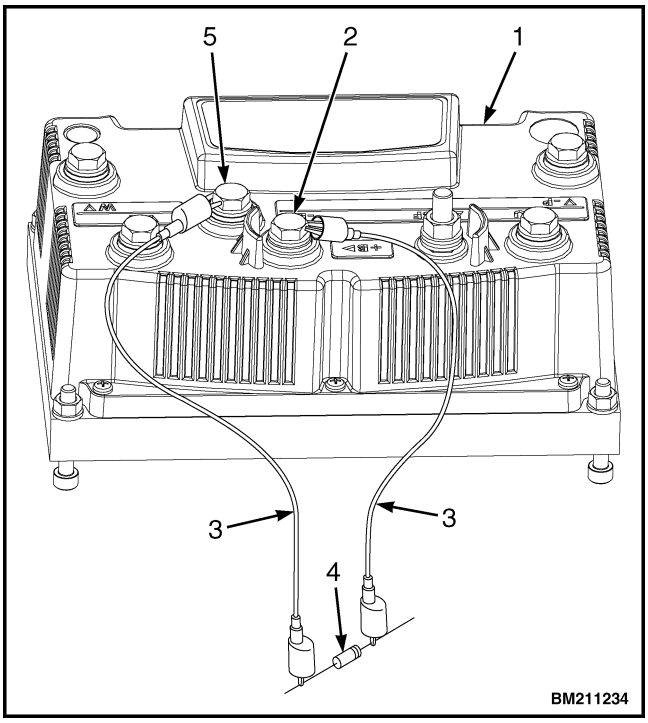
CAUTION

To avoid controller damage, always disconnect the battery. Discharge the capacitor and never put power to the controller with any power wire disconnected. Never short any controller terminal or motor terminal to battery. Make sure to use proper procedures when servicing the controller.

1. Move the truck to a safe, level area. Turn the key switch to the OFF position and disconnect the battery.

2. Remove the drive unit compartment cover to access the drive unit compartment.

3. Discharge the capacitors in the controllers by connecting a 200-ohm, 2-watt resistor across the controller's B+ and B− terminals. See Figure 5. DO NOT short across the motor controller terminals with a screwdriver or jumper wire.



1. CONTROLLER
2. POSITIVE CONNECTION
3. INSULATED JUMPER WIRES
4. 200-OHM, 2-WATT RESISTOR
5. NEGATIVE CONNECTION

Figure 5. Discharging Controller

4. Remove the 200-ohm, 2-watt resistor before reconnecting the battery.

Electrical System Checks

WARNING

Disconnect the battery before opening the compartment cover or inspecting or repairing the electrical system. If a tool causes a short circuit, the high current flow from the battery can cause personal injury or property damage.

The capacitor in the controller can hold an electrical charge after the battery is disconnected. To prevent electrical shock, disconnect the battery and discharge the capacitor before inspecting or repairing any component in the drive unit compartment. Always wear safety glasses.

CAUTION

The correct meter polarity is necessary for the checks. The voltage checks are made between the point indicated and battery negative. Connect the meter negative to battery negative.

Always disconnect the battery and discharge the capacitor before disconnecting cables from the controller. Never put power to the controller with any cables or wires disconnected. Never short any controller or motor terminal to the battery. Always follow proper procedure when working in the electrical system.

1. Turn the key switch to the OFF position.
2. Disconnect and separate the battery connectors.

NOTE: The battery does not have to be removed to check the specific gravity.

3. Check the specific gravity of the battery. If the specific gravity is less than 1.260, the battery is not fully charged or is damaged. A fully charged battery has a specific gravity of 1.270 to 1.290. A discharged battery has a specific gravity of approximately 1.165 or less. Refer to Industrial Battery 2240SRM0001.
4. Remove the drive unit compartment covers. See Periodic Maintenance 8000SRM1635
5. Discharge the capacitor. See Special Precautions in this section.
6. The electric lift truck has a two-wire system. The frame must not be a common electrical path. Using an ohmmeter, check for 50,000 ohms or more between each terminal of the battery connector (truck end) and a clean connection on the frame. Remove any electrical paths between the controller and the frame of the lift truck. Carbon dust in a motor or other parts can cause an electrical path. Check for additional equipment that may provide an electrical path to the frame.
7. Check for voltage between each terminal of the battery connector (battery end) and a clean connection on the frame. Normally there is small voltage (less than 30% of the battery voltage) between the battery and the frame, even though the resistance is very high. A higher voltage can indicate a dirty or damaged battery. Clean battery and battery compartment as necessary.
8. Visually check for parts or wires that are loose or damaged.

WARNING

Some checks require the battery to be reconnected. Do not connect the battery until the point of the procedure when you are directed to do so. Raise the drive wheel of the truck and position on solid hardwood blocks to prevent unexpected movement when working with the battery connected.

9. Always follow proper procedure when working in the electrical system. See Table 1.

NOTE: Make an identification of any wires before you disconnect them. The wires must be connected correctly after checks or repairs.

Table 1. Voltage Checks

LIFT TRUCK WILL NOT MOVE IN EITHER DIRECTION.
NO FAULT IS DISPLAYED ON THE CONTROLLER.

Possible Causes:

1. Battery not connected.
2. Control fuse is damaged.
3. Key switch or brake switch is damaged.
4. Transistor controller connector unplugged.
5. Transistor controller is damaged.

1.0 Check for battery voltage on the battery side of control fuse.	1.01 Battery voltage at control fuse. Check for open control fuse.
	1.02 No battery voltage at control fuse. Connect battery or check wiring between battery and fuse.
1.1 Check for battery voltage at control fuse terminal of key switch.	1.1.1 Battery voltage at key switch. Check for damaged key switch. Check connector.
	1.1.2 No voltage at key switch. Wire to key switch or connections is damaged.
1.3 Key switch closed. Brake switch closed. Check for battery voltage at B+ terminal of transistor controller.	1.3.1 Battery voltage at B+ terminal. Check fault code. If no fault code, possible damaged control handle card.
	1.3.2 No voltage at B+ terminal. Check B- terminal. Check fault code.

Repairs

WARNING

DO NOT make repairs or adjustments unless you have been properly trained and authorized to do so. Improper repairs and adjustments can create dangerous operating conditions. DO NOT operate a lift truck that needs repairs. Report the need for repairs to your supervisor immediately. If repair is necessary, turn the key switch to the OFF position, disconnect the battery, and attach a DO NOT OPERATE tag to the control handle.

Disconnect the battery before opening the drive unit compartment cover or inspecting or repairing the electrical system. If a tool causes a short circuit, the high current flow from the battery can cause personal injury or property damage.

The capacitor in the transistor controller can hold an electrical charge after the battery is disconnected. To prevent electrical shock and personal injury, discharge the capacitor before inspecting or repairing any component in the drive unit compartment. See Special Precautions in this section.

Always wear safety glasses or approved eye protection when making any repairs on lift truck.

All checks, adjustments, and repairs in the drive unit compartment are done with the compartment cover removed. Remove the drive unit compartment cover for access to the electrical components and discharge the capacitor. See the section Periodic Maintenance 8000SRM1635. Replace the covers when service has been completed.

CALIBRATION MODE

In Calibration Mode, service screens can be accessed through the battery discharge indicator LCD. Instructions for the various calibration procedures can be found in the sections:

- User Interface 2200SRM1354

or

- User Interface 2200SRM1353

.

CONTROLLER, REPLACE

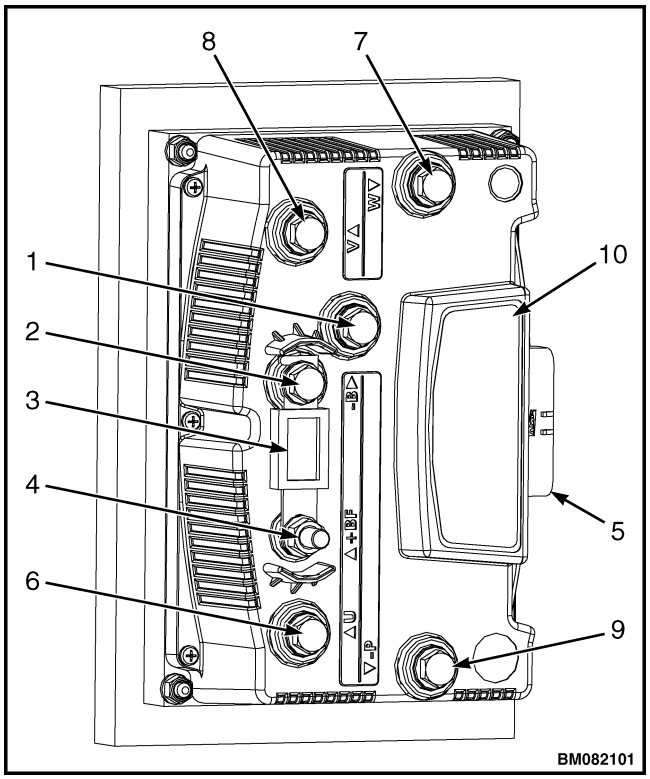
Remove

CAUTION

DO NOT replace the controller until you have thoroughly checked all other electrical components and are sure the controller is malfunctioning.

1. Move the truck to a safe, level location. Turn the key switch to the OFF position, disconnect the battery, and block the drive tire to prevent unexpected movement.
2. Remove the drive unit compartment covers. See the section Periodic Maintenance 8000SRM1635.
3. Discharge the capacitor. See Special Precautions in this section.

4. Tag and disconnect wires from the controller. See Figure 6.



1. B– TERMINAL
2. B+ TERMINAL (POS CONNECTION STD)
3. MAIN FUSE (STD LOCATION)
4. + TERMINAL (POS CONNECTION EE)
5. MAIN CONNECTOR
6. TRACTION MOTOR POS (TERMINAL U)
7. TRACTION MOTOR POS (TERMINAL W)
8. TRACTION MOTOR POS (TERMINAL V)
9. PUMP MOTOR POS (TERMINAL P)
10. LABEL (PART NUMBER)

Figure 6. Controller Wiring

5. Remove mounting screws and remove controller.

Install

1. Install replacement controller on lift truck using mounting hardware.

2. Connect wires and cables to the proper terminals as identified during the removal procedure.

3. Connect battery and turn the key switch to the ON position.

4. Turn parking brake to the OFF position and test for proper operation.

5. Install the drive unit compartment covers. See the section Periodic Maintenance 8000SRM1635.

CONTROL MODULE

Check

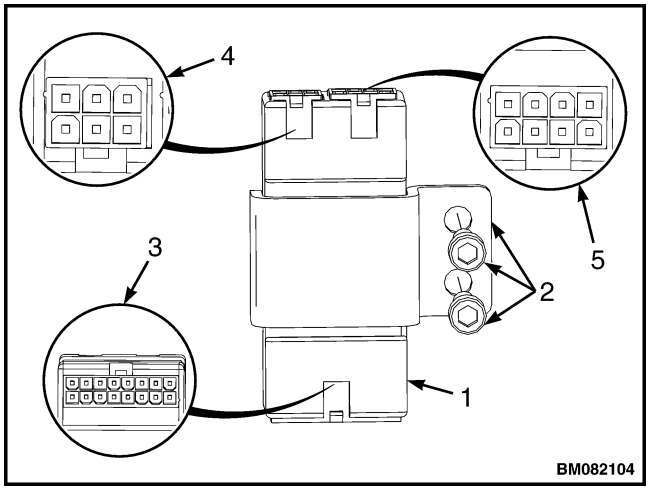
The control module converts analog signals from the control handle to digital signals for the controller to read. If the controller is reporting an input error fault code, then the control module may be malfunctioning. Check the control module using the following steps.

1. Remove drive unit compartment covers for access to the electrical components, and raise the drive tire off the floor to prevent unexpected movement. See the section Periodic Maintenance 8000SRM1635.

2. Connect the battery and turn the key switch to the ON position. Make sure the parking brake switch is in the OFF position.

3. Connect the negative voltmeter lead to the negative battery cable connection at the controller.

4. Disconnect 6way connector B, check pin 3 (on the harness side) for +24V. See Figure 7.



1. CONTROL MODULE
2. MOUNTING HARDWARE
3. CONNECTOR A = 16WAY
4. CONNECTOR B = 6WAY
5. CONNECTOR C = 8WAY

Figure 7. Control Module Connectors

5. Reconnect 6way connector B, check pin 9 on connector A for +5V.

6. If there is no voltage at A9 (+5V), then troubleshoot the module. See the Troubleshooting Manual section.

7. If the voltages are proper readings (in Step 4 and Step 55), then check inputs at connector A while activating each function.

NOTE: Voltage should be present at A3, A4, A5, A6 and ONLY while activating the corresponding function. See Table 2.

8. If the input values differ from those in the table, troubleshoot the control handle components, controller, and wiring. Make any necessary repairs, and recheck the input values.

9. If the input values are correct, replace the control module. See Remove.

NOTE: PC Service Tool may be used to check communication between control handle, control module, and traction controller. See the Troubleshooting Manual section.

Table 2. Input Connector A

16 Pin Connector A			
A1	DI1	First Digital Input	BS
A2	DI2	Second Digital Input	SR
A3	DI3	Third Digital Input	Horn
A4	DI4	Fourth Digital Input	FWD
A5	DI6	Fifth Digital Input	REV
A6	DI6	Sixth Digital Input	Raise
A7	DI7	Seventh Digital Input	Los1
A8	DI8	Eighth Digital Input	Los2
A9	PPOT	Positive of AI1, AI2, AI3, AI4, AI5, AI6	
A10	AI2	Second Analog Input	
A11	AI3	Third Analog Input	
A12	NPOT	Negative of Analog Inputs	

Table 2. Input Connector A (Continued)

16 Pin Connector A			
A13	AI4	Fourth Analog Input	
A14	+BATT	+Battery, Short Circuit to CNB#5	
A15	COMMON	Positive of all the Digital Inputs	Common Microswitch
A16	-BATT	-Battery	Battery Negative

Table 3. Input Connector B

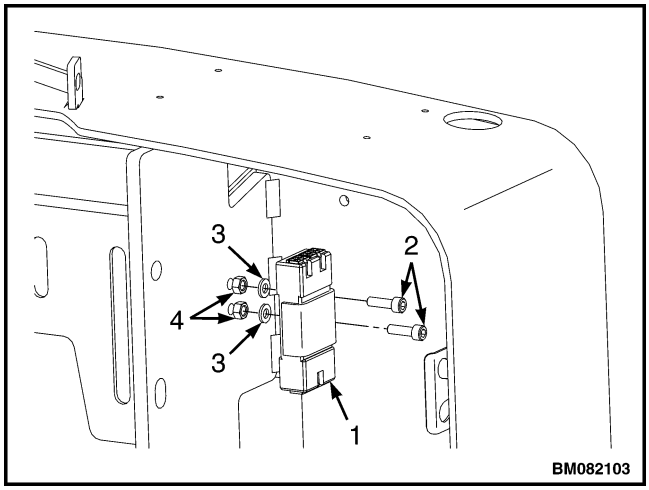
6 Pin Connector B		
B1	CAN LOW	Low Level CAN-BUS Voltage I/O
B2	-BATT	-Battery
B3	+KEY	Key Input
B4	CAN HIGH	High Level CAN-BUS Voltage I/O
B5	+BATT	+Battery, Short Circuit to CNA#14
B6	SAS	Internal Connected to DI1 With a 100 Ohm Resistance

Table 4. Input Connector C

8 Pin Connector C			
C1	DI9	Ninth Digital Input	Tilt Up
C2	AI1	First Analog Input	
C3	NPOT	Negative of Analog Input	
C4	DI10	Tenth Digital Input	Tilt Down
C5	DI14	Fourteenth Digital Input	Reach Out
C6	DI11	Eleventh Digital Input	Side Left
C7	DI12 / AI5	Twelfth Digital Input / Fifth Analog Input	Side Right
C8	DI13 / AI6	Thirteenth Digital Input / Sixth Analog Input	Reach In

Remove

1. Turn the key switch to the OFF position and disconnect the battery.
2. Remove drive unit compartment covers for access to the electrical components. See the section Periodic Maintenance 8000SRM1635.
3. Discharge the capacitors. See Discharging the Capacitors in this section.
4. Disconnect all connectors from the control module.
5. Remove capscrews, lock nuts, and washers securing control module to the frame. See Figure 8.



1. CONTROL MODULE
2. CAPSCREWS
3. WASHERS
4. LOCK NUTS

Figure 8. Control Module Mounting

Install

NOTE: Install new control module with the 16way connector (A) orientation toward the floor mat.

1. Position new control module frame.

2. Install capscrews, washers, and lock nuts to secure module to frame. Tighten to 3.5 N•m (31.0 lbf in).

3. Install connectors to control module.

4. Connect the battery and turn the key switch to the ON position. Test truck for proper operation.

5. Install the drive unit compartment covers. See the section Periodic Maintenance 8000SRM1635. Test the lift truck for proper operation, and return the truck to service.

CONTACTOR

NOTE: Tag and identify wires before disconnecting them. The wires must be connected correctly after checks or repairs. See Figure 10.

Check

Disconnect coil wires. Test contactor coil using an ohmmeter to measure the resistance. Use the highest resistance indication. The coil should read 52 ohms ±10%. Remove and replace contactor if resistance readings indicate a short circuit in both directions or if there is an open circuit in both directions. Make sure coil wires are connected to the proper terminals.

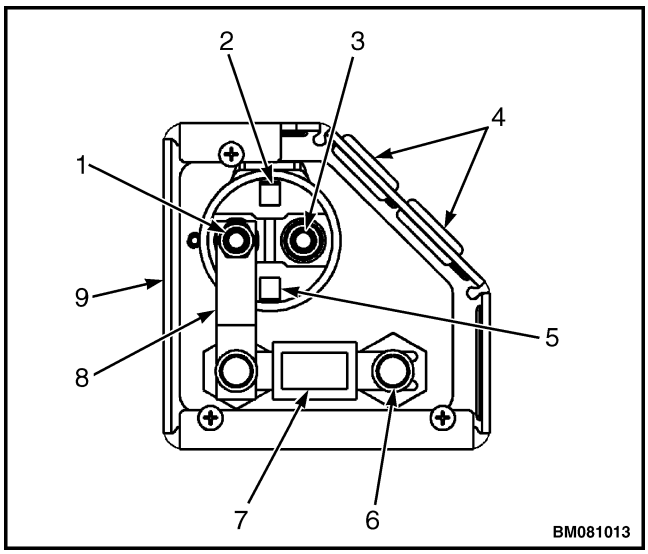
Remove

1. Move the truck to a safe location, turn the key switch to the OFF position and disconnect the battery.

2. Remove the drive unit compartment covers. See the section Periodic Maintenance 8000SRM1635.

3. Discharge the capacitor. See Special Precautions in this section.

4. If the lift truck has an EE rating, remove cover of the contactor box for access to the contactor terminals. See Figure 9.



1. CONTACTOR (POWER OUT)
2. CONTACTOR (TO BATTERY POS)
3. CONTACTOR (POWER IN)
4. GROMMETS
5. CONTACTOR (TO CONTROLLER)
6. TO CONTROLLER B+
7. FUSE
8. BUS BAR
9. ENCLOSURE BOX

Figure 9. Contactor (EE Enclosure)

5. Label and disconnect the wires and cables from the contactor assembly.

6. On EE units, remove fuse, buss-bar, and stand-off to access the contactor mounting screws.

7. Remove two mounting screws located on the side of the contactor and remove contactor assembly. See Figure 10.

Install

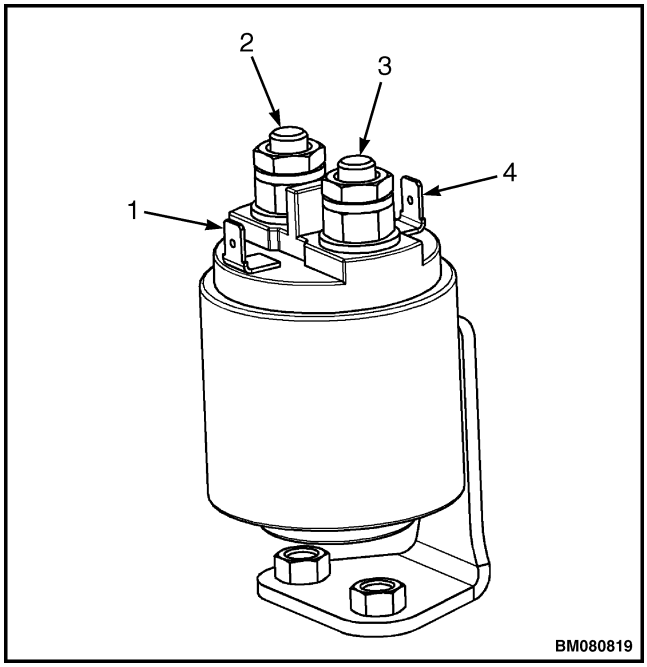
1. Position contactor assembly in place and install two mounting screws into the side of the contactor.

2. On EE units, install stand-off, buss-bar, and fuse to contactor panel and contactor as removed.

3. Install wires and cables to the contactor assembly as removed.

4. Connect the battery, turn the key switch to the ON position and test for proper operation.

5. Install the drive unit compartment covers. See the section Periodic Maintenance 8000SRM1635.



1. CONTACTOR (TO CONTROLLER)
2. CONTACTOR (POWER OUT)
3. CONTACTOR (POWER IN)
4. CONTACTOR (TO BATTERY POS)

Figure 10. Contactor

Key Switch

REMOVE

Toggle switches may be used in place of key switches certain applications. The term "key switch" will be used for both types of switches in the following instructions. See Figure 11 or Figure 12.

1. Move lift truck to a safe area and block drive wheel to prevent unexpected movement.

2. Disconnect battery and turn the key switch to the OFF position.

3. Remove drive unit compartment covers. See Periodic Maintenance 8000SRM1635 .

4. Remove three capscrews holding dash display to frame mount.

5. Lift dash display off frame and disconnect wiring from display unit and ignition switch.

6. Discharge the capacitor. See Special Precautions in this section.

NOTE: Make note of the orientation of the key switch for proper installation.

7. Remove retaining nut from top of the key switch.

8. Remove the key switch from mounting hole in dash display.

9. Tag and identify all wires and connections for reference during reassembly. Disconnect wires from switch.

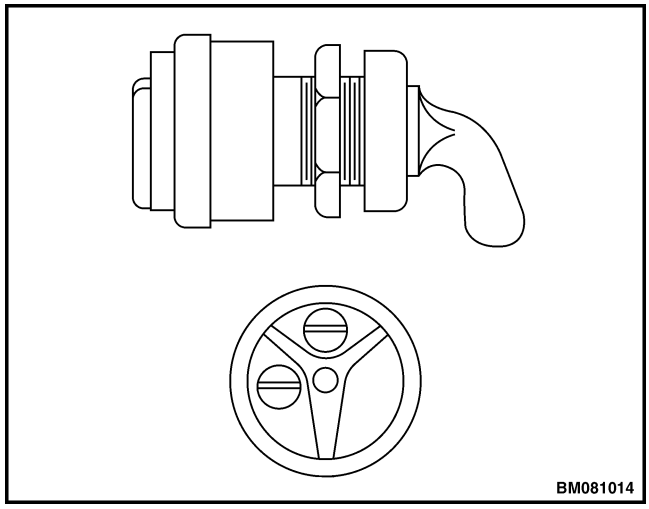


Figure 11. Key Switch (Toggle Type)

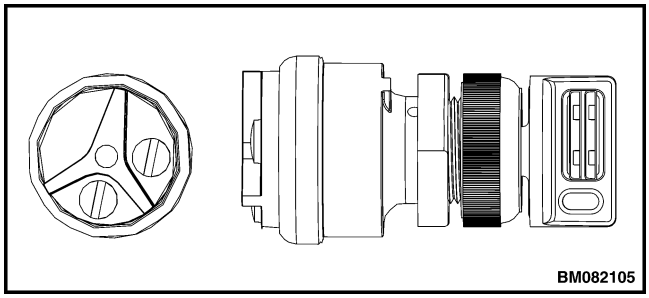


Figure 12. Key Switch

INSTALL

Toggle switches may be used in place of key switches certain applications. The term "key switch" will be used for both types of switch in the following instructions. See Figure 11 or Figure 12.

1. Connect wires to proper terminals, as identified during removal.
2. Position the key switch through mounting hole in dash and adjust switch to proper height by turning lower jam nut.
3. Install retaining nut to the key switch. Make certain switch is properly aligned by referencing label before tightening retaining nut.
4. Connect wiring to ignition switch and dash display.
5. Using three capscrews, install dash display onto frame mount.
6. Connect battery and test the key switch by turning it to the ON and OFF positions. Check for proper operation.
7. Install drive unit compartment covers. See Periodic Maintenance 8000SRM1635.

Parking Brake Switch

REMOVE

For the following procedures, see Figure 13.

1. Move lift truck to a safe area and block drive wheel to prevent unexpected movement.
2. Disconnect battery and turn the key switch to the OFF position.
3. Remove drive unit compartment covers. See Periodic Maintenance 8000SRM1635
4. Discharge the capacitor. See Special Precautions in this section.

NOTE: Make note of the orientation of the parking brake switch for proper installation.

5. Remove retaining nut from top of parking brake switch.
6. Remove parking brake switch from mounting hole in frame.
7. Tag and identify all wires and connections for reference during reassembly. Disconnect wires from switch.

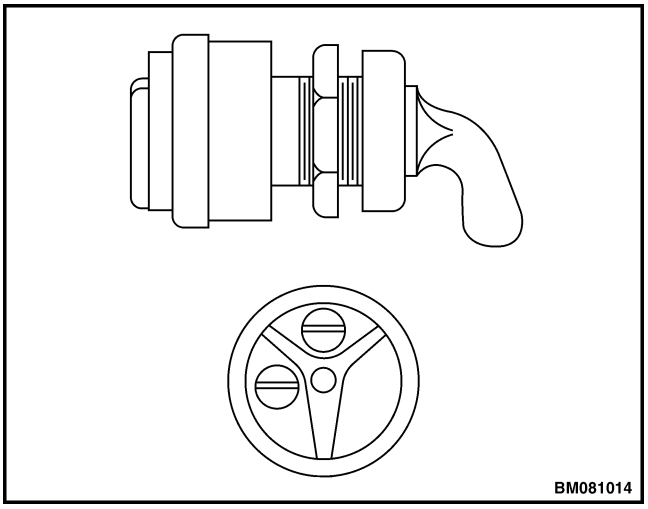


Figure 13. Parking Brake Switch

INSTALL

For the following procedures, see Figure 13.

1. Connect wires to proper terminals, as identified during removal.
2. Install parking brake switch through mounting hole in frame and adjust switch to proper height by turning lower jam nut.

NOTE: Position switch lever according to brake switch decal.

3. Install retaining nut to top of parking brake switch. Make certain switch is properly aligned before tightening retaining nut.
4. Connect battery and turn the key switch to the ON position.
5. Test the key switch by turning it to the ON and OFF positions and checking for proper operation of the brake.
6. Install drive unit compartment covers. See Periodic Maintenance 8000SRM1635

Fuses

WARNING

The capacitor in the transistor controller can hold an electrical charge after the battery is disconnected. To prevent electrical shock and personal injury, discharge the capacitor before inspecting or repairing any component in the drive unit compartment. Wear safety glasses. Make certain the battery has been disconnected.

The motorized hand trucks use two 4-amp in-line fuses (FU 2 and FU 5) for the control circuit, and a single 400-amp (FU 1) fuse mounted on the controller for both the drive motor and the hydraulic pump motor. Remove and replace as required.

If it cannot be determined visually that a fuse has failed, check for continuity using an ohmmeter. Make certain that any replacement fuse is of the right amperage before installation.

Horn

REPLACE

1. Move the truck to a safe, level location; turn the key switch to the OFF position; and disconnect the battery. Block the drive tire to prevent unexpected movement.
2. Remove the drive unit compartment covers. See General in this section.
3. Discharge the capacitor. See Discharging the Capacitors in this section.
4. Disconnect the horn wiring from the main wiring harness.

CAUTION

DO NOT overtighten horn mounting hardware.

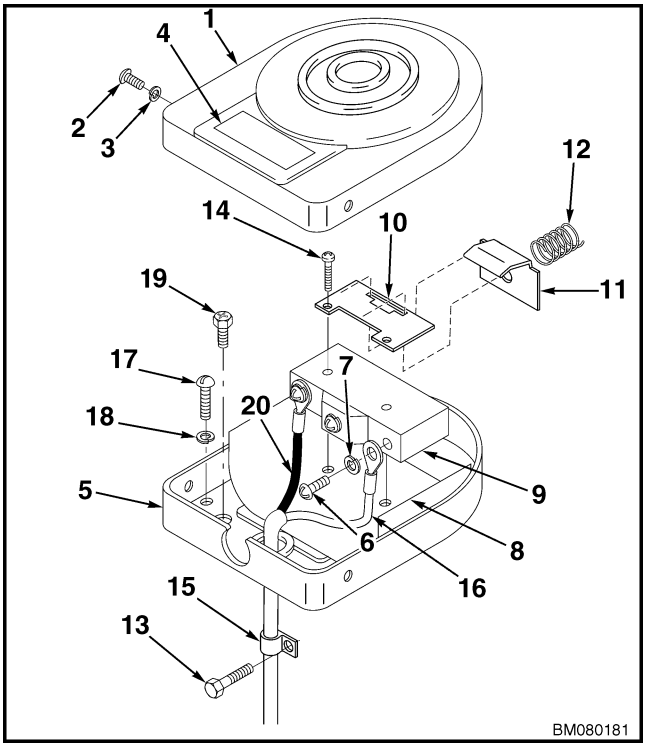
5. Remove nuts and washers from bolts securing horn to frame. Remove horn from bolts. Position new horn onto bolts as removed and install washers and nut.
6. Install wiring to horn as removed.
7. Connect the battery, turn the key switch to the ON position, and test for proper operation. Turn the key switch back to the OFF position and disconnect the battery again to finish repairs.
8. Install the drive unit compartment covers as removed. See General in this section. Return the lift truck to service.

High Speed Switch Assembly

The high speed switch is mounted to the floor of the operator's compartment. The operator depresses the switch using the right foot to increase the travel speed of the truck. Proper operation of the high speed switch increases productivity by reducing travel times. The high speed switch assembly must be disassembled to install. Perform only the removal steps necessary to repair switch and install. Refer to Figure 14 for the following procedures.

REMOVE

1. Move the truck to a level area. Turn the key switch to the OFF position and disconnect the battery.
2. Remove the floor mat to access the switch.
3. Remove the two screws (2) and lockwashers (3) from the side of the switch to release the top cover.
4. Remove the two screws (17) and lockwashers (18) attaching the base to the frame.
5. Remove the two screws securing the actuator and actuator plate and switch to the base.
6. Remove actuator from actuator plate.
7. Tag and identify wires to the switch. Remove the screws (6) and lockwashers (7) attaching the wiring harness to the switch.



1. COVER
2. SCREW
3. LOCKWASHER
4. NAMEPLATE
5. BASE
6. SCREW
7. LOCKWASHER
8. INSULATION
9. SWITCH
10. ACTUATOR PLATE
11. ACTUATOR
12. SPRING
13. SCREW
14. SCREW
15. CABLE CLAMP
16. WHITE WIRE
17. SCREW
18. LOCKWASHER
19. GROUND SCREW
20. BLACK WIRE

Figure 14. Foot Switch

INSTALL

1. Pull wires through rubber grommet in bottom of base. Install wires to switch as removed. See Figure 14.

2. Install the screws (6) and lockwashers (7) securing the wiring harness to the switch as removed.

3. Install actuator to actuator plate in the orientation shown.

4. Attach actuator and actuator plate to switch by inserting screws (14).

5. Place switch assembly into base as removed.

6. Center the spring inside the base between the curved side and the actuator.

7. Pull the switch toward the spring to align screws with holes in base and tighten to secure in place.

8. Secure the switch assembly to the floor of the operator's compartment using screws (17) and lockwashers (18).

9. Secure top cover to base using screws (2) and lockwashers (3).

10. Connect the battery and turn the key switch to the ON position.

WARNING

Move the truck to an area with plenty of room where top speeds can be checked safely.

11. Test the high speed switch for proper operation.

12. Install the floor mat.

Control Handle

DISASSEMBLE

WARNING

DO NOT make repairs or adjustments unless you have both authorization and training. Repairs and adjustments that are not correct can create a dangerous operating condition. DO NOT operate a lift truck that needs repairs. Report the need for repairs to your supervisor immediately. If repair is necessary, put a DO NOT OPERATE tag on the control handle. Remove the key from the key switch.

It is not always necessary to remove and disassemble all the components of the control handle to replace a damaged part. Perform only the steps necessary to replace the damaged parts. See Figure 15.

1. Move truck to a safe, level area.
2. Block wheels to prevent truck from moving.
3. Remove the key from the key switch. Disconnect battery.

Hand-brake

Refer to Figure 15 for the first three steps and Figure 16 thereafter.

1. Remove the three screws (39, 7) and washers (40) retaining the hand-brake cover. Remove hand-brake cover.
2. Tag, identify, and disconnect all wires connecting control handle to the hand-brake assembly.
3. Remove hand-brake assembly from control handle by removing two capscrews (43), washers (44), and nuts (45).

NOTE: No further disassembly is required if only removing the hand-brake assembly from the control handle. If disassembly is required on the hand-brake, perform only the steps necessary to complete the repairs. Refer to Figure 16 for the following steps.

4. Remove lock nut (9) from bottom of the hand-brake assembly.

CAUTION

Handle return spring is constantly under tension. Use caution when removing lower handle from the assembly.

5. Slide hand lever (RH), spacer (7), and spring from assembly.

NOTE: Keep spacer(s) together for proper reassembly.

6. Remove screws (21), switch, and six spacers (18) from hand lever (RH).
7. Slide hand lever (LH) and washer (4) from assembly.
8. Remove screws (21), switches, and six spacers (18) from bracket.
9. Remove grips, screws (11), and washers (10) from each hand lever if necessary.
10. Remove screws (20), six spacers (18), jumper wires, and switches from bracket.
11. Remove bumpers, washers (15), stand-off, and capscrews (13, 14) from bracket.

Upper Cover

Refer to Figure 15.

1. Remove four screws (20, 17) and lockwashers (16) that hold upper and lower covers of control handle head together.
2. Lift upper cover of control handle head off of lower cover.
3. Unplug connector 3A (control handle wiring harness) and place upper cover on a clean workbench.

NOTE: The next two steps are only necessary if replacing the upper cover. If not replacing upper cover, skip to Step 6.

4. Remove large screw (12), lockwasher (11), and washer (24) that hold actuator plug to upper cover of control handle.
5. Remove actuator plug.
6. Remove four screws (14) and lockwashers (13) that hold switch support bracket in upper cover of control handle.
7. Remove switch support bracket.
8. Tag and identify all wire connections for reference during reassembly.
9. Remove wires and replace switch(es) if defective.

Handle Shaft

For the following instructions, refer to Figure 15.

1. Remove cotter pin (38) and link rod (37).
2. Remove two screws (23), lockwasher (35), and washers (24) securing handle to bracket.
3. Remove handle shaft (27) from bracket (22).
4. Remove left and right handles (26), link sleeve (36), and backup washers (25).

Lower Cover

1. Remove cotter pin from link rod and remove link rod.
2. Tag and identify all wire connections for reference during assembly.
3. Unplug connector 4A (throttle Hall effect sensor wiring harness).

4. Unplug four wires connected to forward and reverse switches.

5. Remove two capscrews (29) and lockwashers (30) that hold the plate and lower cover of control handle head to the control arm shaft (31).

6. Remove plate and lower cover of control handle head and place on a clean workbench.

Directional/Throttle Switch

1. Remove two screws (19) and lockwashers (18) that hold directional/throttle switch assembly to lower cover of control handle head. See Figure 15.

2. Tag and identify all wire connections for reference during reassembly.

3. Disconnect all wires.

4. Remove directional/throttle switch assembly.

Neutral Switches

Refer to Figure 17 for the following procedures.

1. Use locking pliers to hold the threaded standoff while removing screw (5).

2. Remove upper screws (7).

3. Remove nutplate.

4. Remove directional switches, insulators, and spacer.

Throttle Sensor

Refer to Figure 17 for the following procedures.

NOTE: Make note of the orientation of the gears or mark alignment to assist in reassembly.

1. Make note or mark alignment of gears (refer to Figure 18).

2. Loosen two setscrews (13) that hold sensor gear to sensor and remove gear. See Figure 17.

3. Remove nut (11) and lockwasher (10) that holds sensor to bracket.

4. Remove sensor (8).

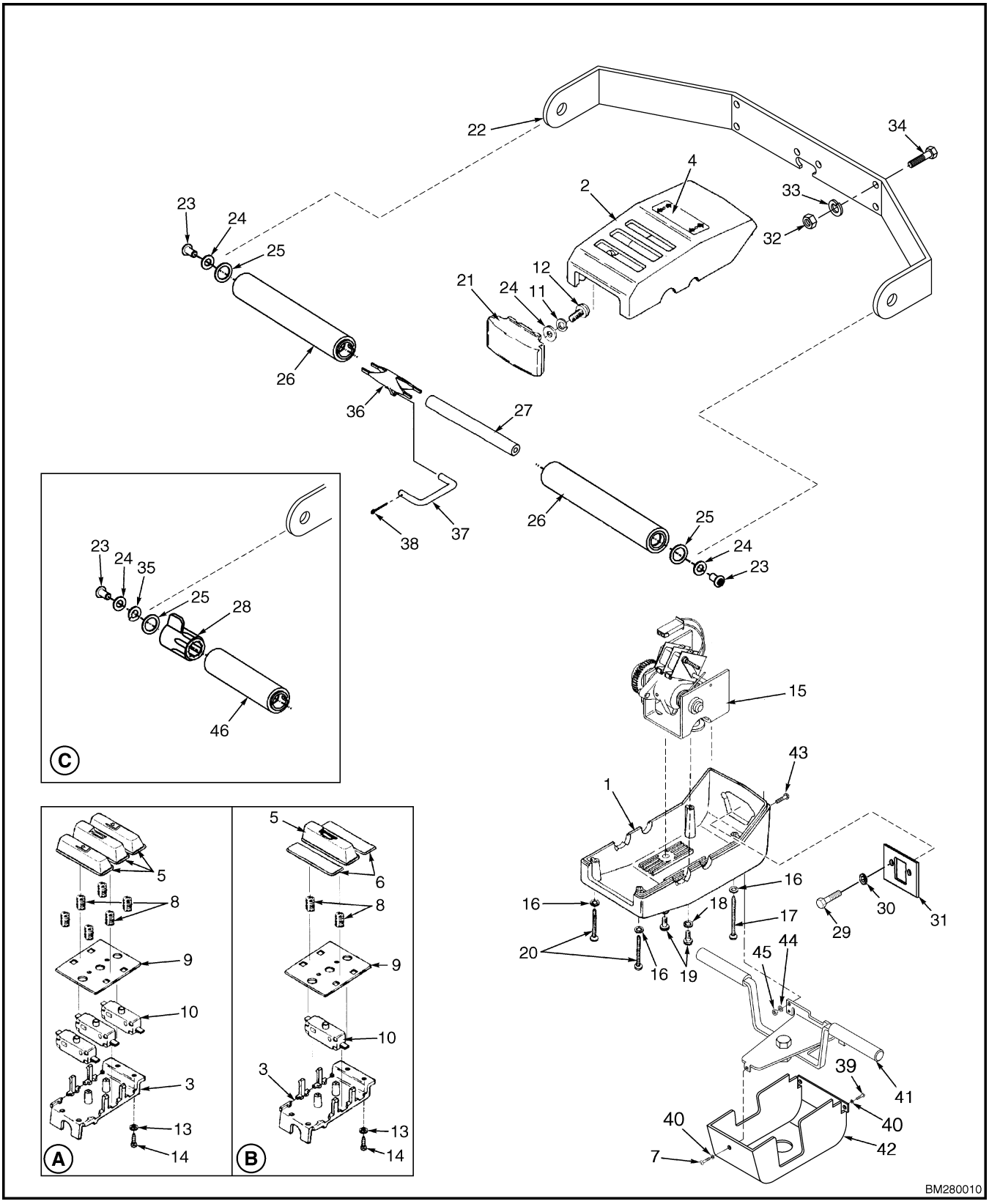


Figure 15. Control Handle Assembly