SERVICE REPAIR

MANUAL

Hyster W65Z (A229), W60Z (A231), W80Z (A234) Forklift

HYSTER

STEERING MECHANISM

B60Z [A230]; W60Z [A231]; W65Z [A229]; B80Z [A233]; W80Z [A234]; W30-40ZA [B453]; W25-30-40ZC [B454]; W20-30ZR [B455]

HYSTER

PART NO. 1500199

1600 SRM 962

SAFETY PRECAUTIONS
MAINTENANCE AND REPAIR

- 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 condition that can cause immediate death or injury!

CAUTION

Indicates a condition that can cause property damage!

TABLE OF CONTENTS

This section is for the following models:

B60Z [A230];
W60Z [A231];
W65Z [A229];
B80Z [A233];
W80Z [A234];
W30-40ZA [B453];
W25-30-40ZC [B454];
W20-30ZR [B455]

"THE
QUALITY
KEEPERS"

HYSTER
APPROVED
PARTS

General

The control handle assembly is designed to perform several functions. The standard control handle includes the speed/direction control and buttons for the horn, traction reversing, and hydraulic functions. The control handle is connected to the master drive unit (MDU) and is used to steer the truck as it turns the MDU. The MDU is supported by a bearing that is mounted to the frame. Move the control handle left or right to turn the drive/steer tire and steer the truck. Controls mounted in the handle are linked to the control panel by a wiring harness that passes through the center of the handle. The brake is applied when the handle is in the full up or down position.

The bottom-mounted control handle assembly is used on the W60/65/80Z, W30/40ZA, W20/30ZR, and W25/30/40ZC lift trucks. The handle is designed to be used while the operator is walking beside the lift truck. The top-mounted control handle assembly is used on the B60/80Z lift trucks. This model is designed to be used while the operator is either walking beside the truck or riding on a small platform to the left or right side of the handle.

Special Precautions

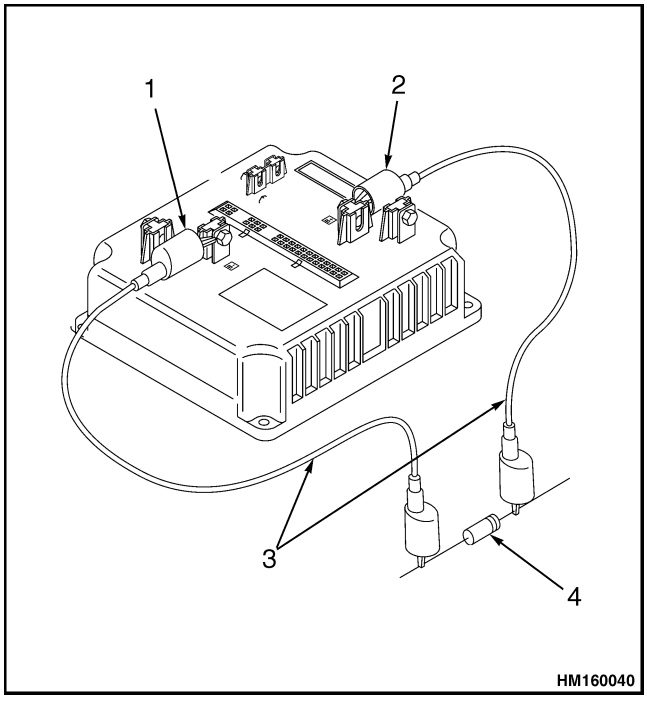
WARNING

To avoid personal injury and prevent electrical shock, perform the following steps before troubleshooting or adjusting and before connecting or disconnecting a handset or personal computer.

CAUTION

To avoid controller damage, always disconnect the battery, discharge the capacitor, and never put power to the controller while any power wires are disconnected. Never short any controller terminal or motor terminal to the battery. Make sure to use proper procedure when servicing the controller.

1. Turn key switch to **OFF** position and disconnect the battery.
2. Discharge the capacitors in the controllers by connecting a 200-ohm, 2-watt resistor across the controller's B+ and B− terminals. DO NOT short across the motor controller terminals with a screwdriver or jumper wire. See Figure 1 and Figure 2.
3. Remove the 200-ohm, 2-watt resistor before reconnecting the battery.



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

Figure 1. Discharging Controller W60/65/80Z and B60/80Z

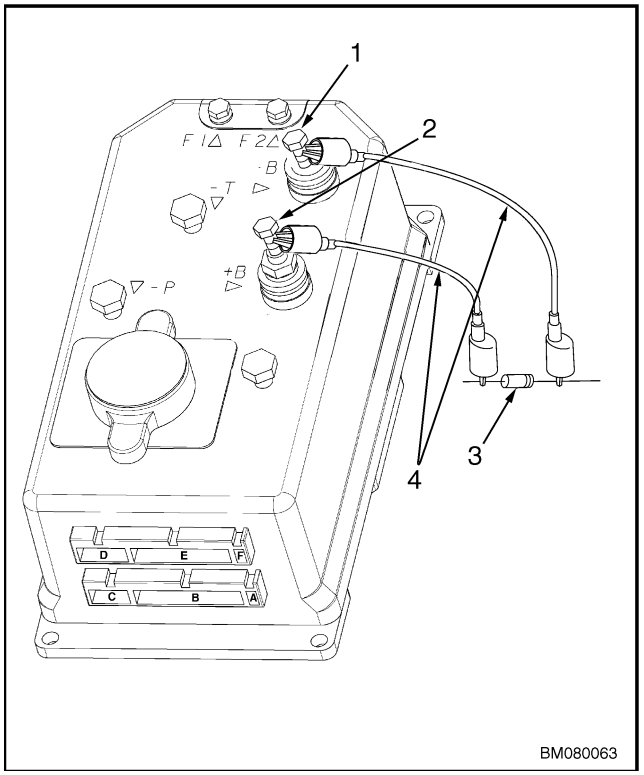


Figure 2. Discharging Controller - W30/40ZA, W20/30ZR, and W25/30/40ZC

Legend for Figure 2

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

Control Handle Head

Refer to **Electrical System** for your lift truck, 2200 SRM 929 or 2200 SRM 1026, for instructions on removing and installing the control handle head from the control handle. The instructions for disassembly and assembly of the control handle head can be located in the same manual.

Control Handle

W60/65/80Z, W30/40ZA, W20/30ZR, AND W25/30/40ZC

Remove

Refer to Figure 3 for the following instructions.

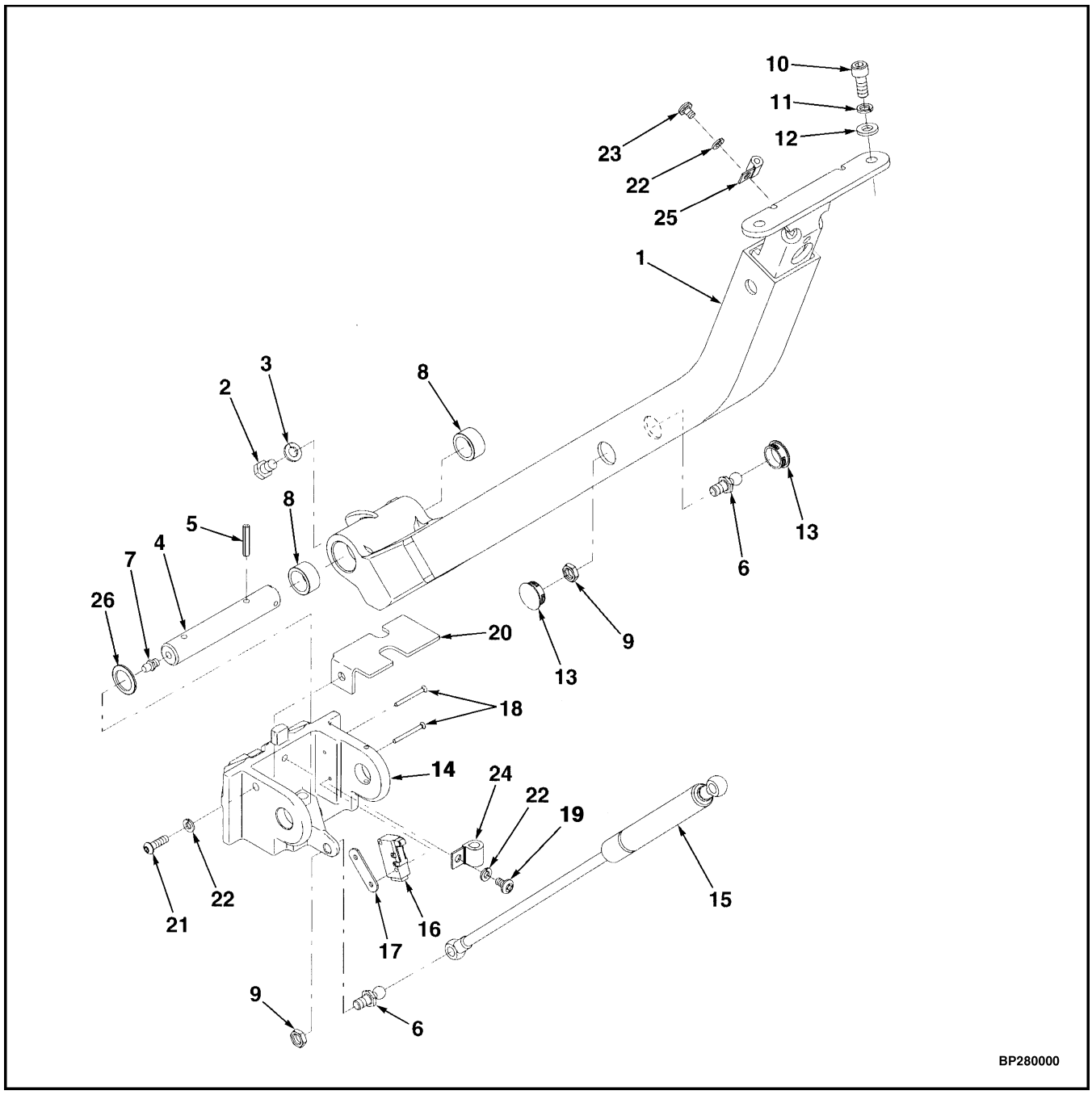
WARNING

The gas springs used on the control handle have tension and can release with enough force to cause personal injury or property damage.

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.

1. Disconnect the battery and remove the drive unit compartment cover.
2. Discharge the capacitors. See Special Precautions in this section.



1. CONTROL HANDLE ARM
2. CAPSCREW
3. LOCKWASHER
4. PIVOT SHAFT
5. PIN
6. BALL STUD
7. GREASE FITTING
8. BUSHING
9. NUT
10. CAPSCREW
11. WASHER
12. LOCKWASHER
13. PLUG
14. SUPPORT BRACKET
15. GAS SPRING
16. BRAKE SWITCH
17. NUTPLATE
18. SCREW
19. SCREW
20. COVER
21. SCREW
22. WASHER
23. SCREW
24. CLAMP
25. CLAMP
26. SHIM(S)

Figure 3. Control Handle Mounting (W60/65/80Z, W30/40ZA, W20/30ZR, and W25/30/40ZC)

NOTE: Note the routing of wiring harness during disassembly for proper reassembly.

CAUTION

Do not cut wires when removing wire ties.

3. **CAREFULLY** cut wire ties that hold the brake, brake switch, and control handle wire harnesses in a bundle to the right rear of MDU.

NOTE: It is not necessary to disconnect the four pin connector for the brake wiring harness when the two pin connector has been disconnected.

4. Tag and disconnect the brake wiring harness (two pin connector) located near the brake.

5. Tag and disconnect the brake switch wiring harness (two pin connector) located in the area of the drive motor.

6. Tag and disconnect the control handle wiring harness (six pin connector) located in the area of the drive motor.

7. Remove nuts and wire clamps from both right side studs on the MDU. Remove wire harness from clamps.

8. Remove cover (20) by removing screw (21) and lockwasher (22).

9. If necessary, remove the control handle head. See **Electrical System** 2200 SRM 1026. Remove the control handle wiring harness by removing clamp (25) and pulling wiring harness through the control handle arm.

10. Remove gas spring from lower ball stud.

11. Remove pin (5) from pivot shaft and slide shaft out. Recover shims (26) for later installation.

12. Remove the control handle arm from the support bracket and remove bushings from control handle arm if necessary.

13. Remove plugs, nut, gas spring, and ball stud from upper arm.

Install

1. Install the bushings into control handle arm if removed.

2. If control handle head has been removed, install control handle head to control handle arm. See **Electrical System** 2200 SRM 1026. Route control handle wiring harness through control handle arm and secure with clamp (25), screw (23), and lockwasher (22).

3. Install ball studs, gas spring, and nut to control handle arm. Tighten nut to 2.26 N•m (20 lbf in) and install plugs (13).

NOTE: Install shims onto pivot shaft as required to minimize side to side movement of handle.

4. Install control handle arm into the support bracket using pivot shaft, shims, and pins. Install shims between the control handle arm and support bracket on the **LEFT** side of the support bracket (side nearest the controller).

5. Install gas spring to ball stud on support bracket.

CAUTION

The wiring must be routed properly to prevent steering problems and prevent chafing of the harness.

CAUTION

Verify that the harness is not wrapped around gas spring. Check harness with handle in the up, down, full left, and full right positions.

6. Loosely route the control handle and brake switch wiring harnesses up from the support bracket to the right, front stud of the drive motor. Using a wire clamp, secure wiring harnesses to top of stud leaving enough slack (approximately 400 mm (16 in.)) between clamp and support bracket to allow drive unit to turn from left stop to right stop without restriction.

7. Route the control handle and brake switch wiring harnesses from the right, front stud to the right, rear stud of the drive motor. Using a wire clamp, secure wiring harnesses to top of stud.

8. Connect brake wiring harness (two pin connector) located near the brake.

9. Connect brake switch wiring harness (two pin connector) located in the area of the drive motor.

10. Connect control handle wiring harness (six pin connector) located in the area of the drive motor.

11. Install cover to support bracket using screw (21) and lockwasher (22).

CAUTION

On the W60/65/80Z models, the wiring harnesses may pull when operating the LIFT/ LOWER functions. Raise and Lower the lift truck to measure the amount of wire needed to allow proper operation BEFORE installing wire ties.

12. Bundle brake, brake switch, and control handle wiring harnesses until tight and secure with wire ties.

13. Connect the battery and test for proper operation prior to returning the lift truck to service.

14. Install the drive unit compartment cover.

Control Handle

B60/80Z

The following procedures describe the removal and disassembly of the control handle and dash assemblies for the B60/80Z. The control handle and dash assembly may be removed as a single assembly with no further disassembly. This is useful when the control handle and dash assembly must be removed to access other components of the lift truck. For instruction on removing the control handle and dash assembly as a complete unit, see Steering and Dash Assembly (Complete).

Remove (Handle)

Refer to Figure 4 for the following instructions.

WARNING

The gas springs used on the control handle have tension and can release with enough force to cause personal injury or property damage.

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.

1. Disconnect the battery. Remove the drive unit compartment cover to access the wiring and control handle mounting.

2. Discharge the capacitors. See Special Precautions in this section.

CAUTION

Do not cut the wiring harnesses when removing the wire ties.

NOTE: It is not necessary to remove the main wiring harness unless harness is damaged and is being replaced.

3. **CAREFULLY** cut the wire ties securing the brake, brake switch, and control handle wiring harnesses together at the right rear of MDU.

NOTE: Be certain to note the routing of the wires before disconnecting any wire. The wiring must be routed properly at assembly to prevent steering problems and prevent chafing of the harness.

4. Tag and disconnect the brake wiring harness (two pin connector) located near the brake.

5. Tag and disconnect the brake switch wiring harness (two pin connector) and if equipped, the optional coast control switch (two pin connector).

6. Tag and disconnect the control handle wiring harness (three pin connector).

7. Remove the clamps that hold the wiring harnesses to the right side motor mounting studs.

8. Remove cover from swivel by removing three Allen-head screws.

9. Remove gas spring from ball stud on swivel.

10. Remove plugs (3), ball studs, gas spring, and nuts from control handle arm and swivel.

11. Remove locking bolt from control handle arm and slide pivot shaft out. Recover shims for later installation. Remove the control handle arm from the swivel.

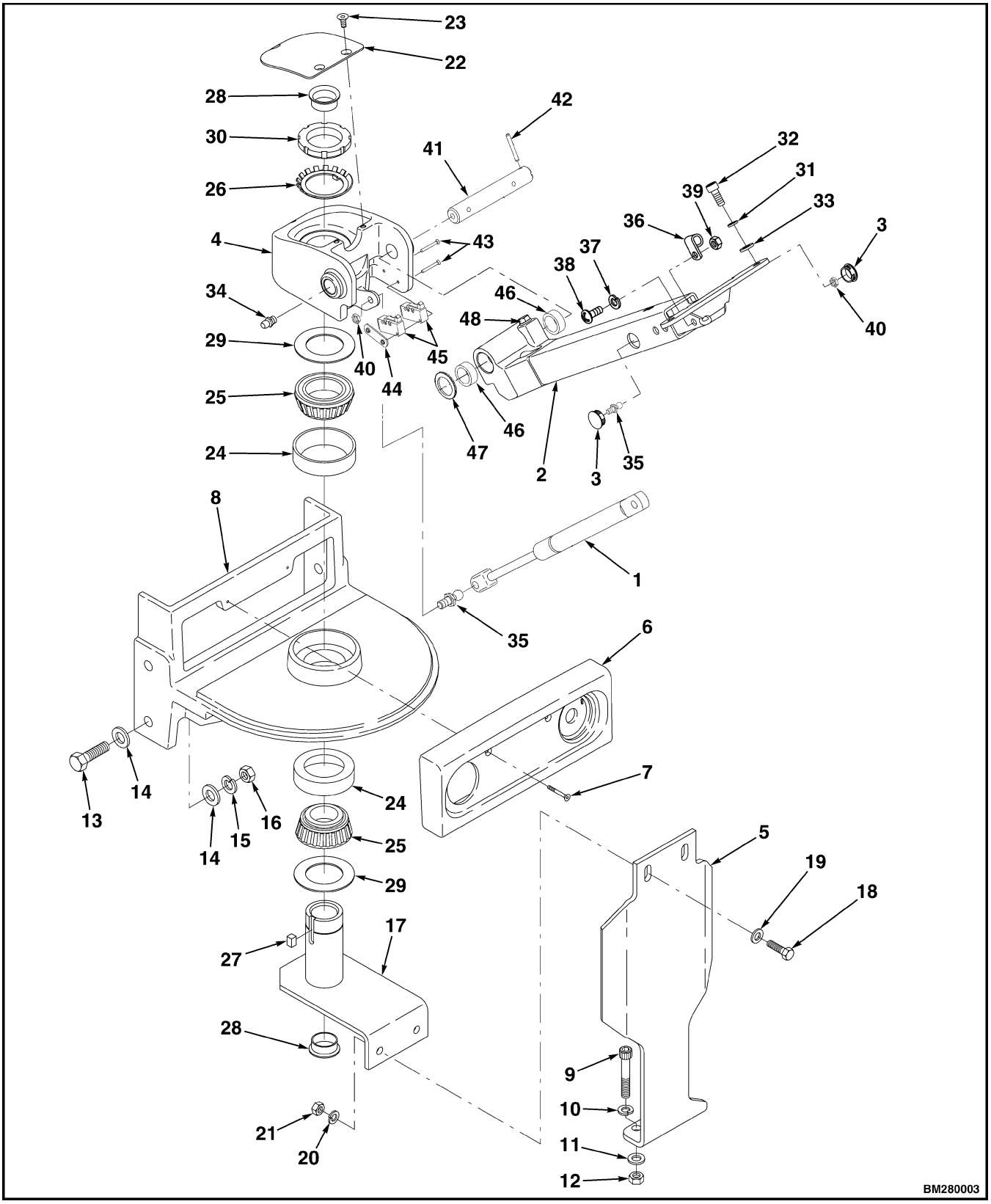


Figure 4. Control Handle Mounting B60/80Z

Legend for Figure 4

1. GAS SPRING
2. CONTROL ARM
3. PLUG
4. SWIVEL
5. STEER PLATE
6. DASH COVER
7. CAPSCREW
8. SUPPORT
9. CAPSCREW
10. WASHER
11. LOCKWASHER
12. NUT
13. CAPSCREW
14. WASHER
15. LOCKWASHER
16. NUT
17. STAND-OFF
18. CAPSCREW
19. WASHER
20. LOCKWASHER
21. NUT
22. COVER
23. CAPSCREW
24. BEARING RACE
25. BEARING
26. LOCKING WASHER
27. WOODRUFF KEY
28. SLEEVE
29. SPACER
30. NUT
31. LOCKWASHER
32. CAPSCREW
33. WASHER
34. FITTING
35. BALL STUD
36. CLAMP
37. LOCKWASHER
38. SCREW
39. NUT
40. NUT
41. PIVOT SHAFT
42. PIN
43. SCREWS
44. NUT PLATE
45. BRAKE SWITCH
46. BUSHING
47. SHIM(S)
48. LOCKING BOLT

12. Carefully pull the wiring harnesses through the center of the support.

13. Remove bushings from the control handle arm if necessary.

14. If necessary, remove the control handle head. See **Electrical System** 2200 SRM 1026. Remove nut (39) and clamp (36) and pull wiring harness through control handle arm.

15. Remove two screws (43) from the swivel and remove the brake switches and nutplate.

Steer Bearings and Support

Disassemble

1. Remove control handle swivel:

a. Remove cover (22) by removing screws (23).

b. Remove nut (30) by bending tabs on locking washer (26) down using a flat screwdriver and turning nut counterclockwise.

c. Remove nut and locking washer.

2. Lift control handle swivel off dash and stand-off shaft and recover Woodruff key.

3. Remove dash cover by removing screws (7).

4. Remove stand-off (17), spacer (29), and lower bearing (25) :

a. Remove capscrews (18), washers (19, 20), and nuts (21) securing stand-off to steer plate.

b. Lower stand-off and bearing assembly from the support.

c. Remove the lower bearing from stand-off using a standard bearing puller then remove spacer by hand.

d. Remove lower sleeve (28) from bottom of stand-off.

5. Remove upper sleeve (28), spacer (29), and upper bearing (25).

NOTE: Be careful not to damage bearing races or support when removing bearing races.

6. Clean and inspect bearing races for pits and grooves.

7. Remove bearing races from support using a hammer and punch if damaged.

Repair

Clean the bearing assemblies by washing them in solvent to remove all grease and dirt. When clean, the bearing assemblies should **ALWAYS** roll smoothly. Place the bearing inside the race. Turn the bearing while applying pressure with your hand to check for places where the bearing does not turn smoothly. Inspect the bearing assembly for pits or grooves. If any rough places are found, replace the bearing with a new bearing assembly.

Assemble

1. Install bearing races to support using a hammer and proper size bearing driver, if removed.
2. Pack bearings with multipurpose #2 grease with 2 to 4% molybdenum disulfide using a standard bearing packing device.
3. Install stand-off (17) and bearing assembly:
   a. Install spacer and lower bearing to stand-off using a press.
   b. Install sleeve to bottom of stand-off.
   c. Lift stand-off and bearing assembly into the support.
   d. Install capscrews (18), washers (19, 20), and nuts (21) to secure stand-off to steer plate.
4. Install upper bearing (25) and spacer (29) to stand-off shaft.
5. Position Woodruff key into groove on stand-off shaft and lower swivel onto shaft. Turn swivel left and right alternately to align groove with Woodruff key **WHILE** holding Woodruff key in place.
6. Install locking washer (26) and nut (30) to end of stand-off shaft. Tighten nut to 26 N•m (19 lbf ft) and bend tabs on locking washer against nut.
7. Install sleeve (28).
8. Install control handle wiring harness through support.
9. Place cover (22) on swivel (4) and secure with screws (23).

Install (Handle)

1. Install brake switches and nutplate into the swivel (4) using two screws.
2. Install bushings into the control handle arm if removed.
3. Install control handle head if removed. See **Electrical System** 2200 SRM 1026. Pull wiring harness though control handle arm and secure with clamp (36) and nut (39).
4. Install ball studs and nuts to control handle arm and swivel. Tighten nuts to 2.6 N•m (20 lbf in) and install plugs.
5. Route the control handle and brake switch wiring harnesses down through the sleeves in the support. Carefully pull the wiring harnesses through the center of the support.

NOTE: Install shims onto pivot shaft as required to minimize side to side movement of handle.

6. Install control handle arm into the swivel using pivot shaft, shims, and locking bolt. Install shims between the control handle arm and swivel on the **LEFT** side of the swivel (side nearest the controller).
7. Install gas spring to ball stud on swivel.

CAUTION

Make certain that the wiring is properly routed to prevent steering problems and chafing of the harness.

8. Connect the control handle wiring harness to the main wiring harness.
9. Connect the brake switch connector and, if equipped, the optional coast control.

CAUTION

Verify that the wiring harness is not wrapped around gas spring. Check the wiring harness with the control handle in the up, down, full left, and full right positions.

10. With the control handle in the upright position, pull the harness and install the clamps that hold the control handle harness to the motor. Secure the wiring harness with slack between the clamp and the main wiring harness to allow for side to

side movement when the control handle is turned in any direction.

11. Remove excess slack by bundling control handle, brake, and brake switch wiring harnesses and secure using wire ties.

12. Connect the battery and test the operation of the truck prior to returning the lift truck to service.

13. Install the drive unit compartment cover.

Steering and Dash Assembly (Complete)

REMOVE

The following procedure applies only to the B60/80Z lift trucks only.

WARNING

The steering assembly and dash weighs approximately 30 kg (66 lb), and requires the use of an overhead lifting device to hold it in place during removal and installation. Be sure the overhead lifting device has an adequate rated capacity to lift at least 30 kg (66 lb).

WARNING

Be careful when removing or installing snap rings. The snap rings may come loose during removal or installation with enough force to cause personal injury. Always use the proper snap ring pliers and wear eye protection during removal and installation.

The following instructions are for removing the entire dash and control handle assembly without disassembly. This procedure is useful when the dash and control handle must be removed for access to other parts of the lift truck.

1. Disconnect battery and discharge capacitors. See Special Precautions.

2. Secure one end of a rope or cargo strap around the steering assembly plate between the dash and the Control Handle assembly. Secure the other end to an overhead lifting device sufficient to lift at least 30 kg (66 lb). See Figure 5.

3. Remove the four capscrews, nuts, and washers that hold the steering support to the frame. Remove the two capscrews attaching the support to the support bracket.

4. Remove the ignition switch by removing the key, unscrewing the nut, and removing the ignition switch from the rear. Disconnect all wires and cables, making sure to tag them for reassembly.

5. Using the overhead lifting device, carefully remove the steering assembly from the truck.

INSTALL

1. Secure one end of a rope or cargo strap around the steering assembly plate between the dash and the Control Handle assembly. Secure the other end to an overhead lifting device sufficient to lift at least 30 kg (66 lb).

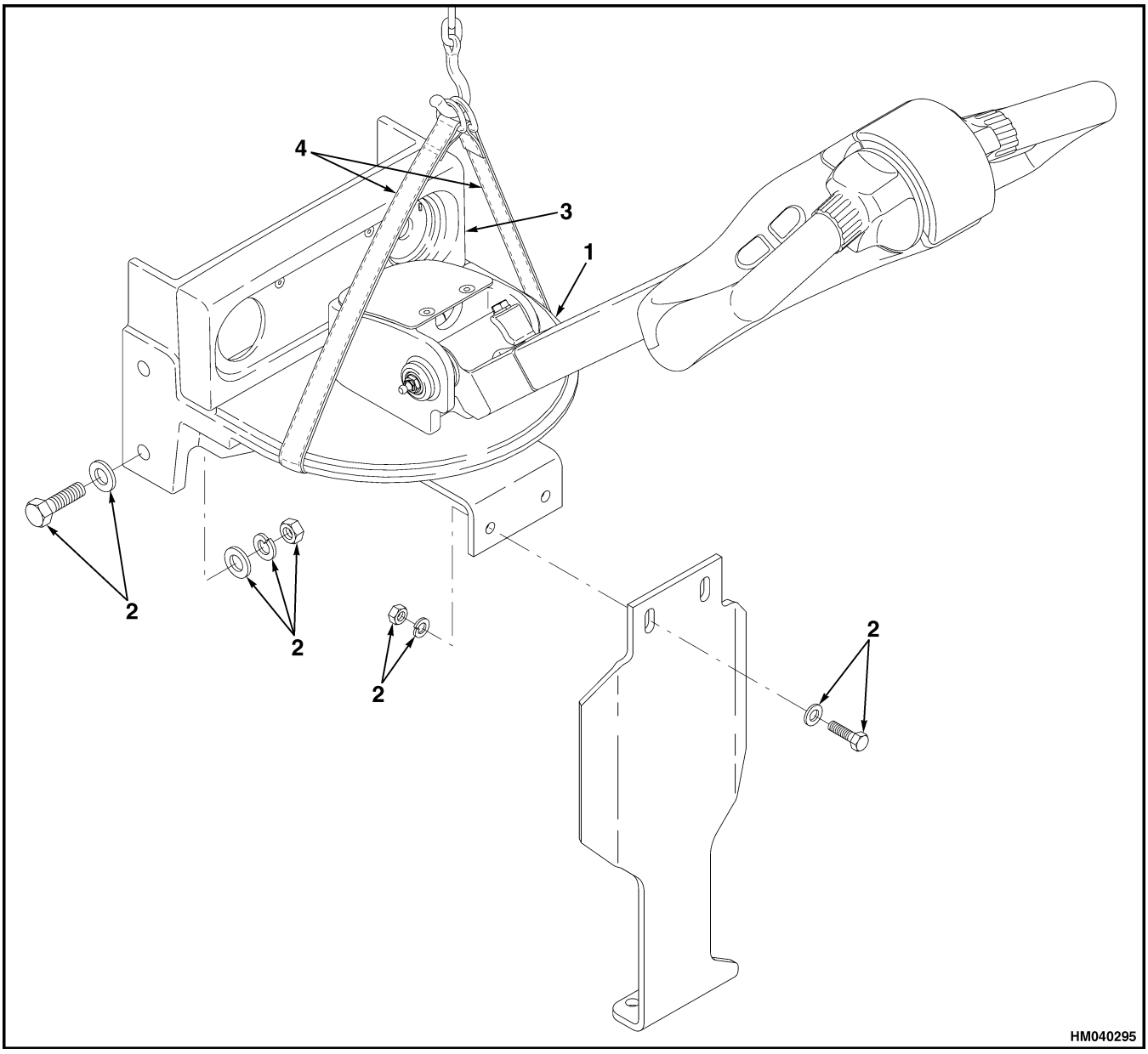
2. Using the overhead lifting device, carefully install the steering assembly and dash onto the truck.

3. Install the ignition switch and all wires and cables.

4. Install the four capscrews, nuts, and washers that hold the steering support to the frame. Torque to 88 N•m (65 lbf ft).

5. Install the two screws attaching the dash to the support bracket.

6. Connect the battery and test for proper operation before returning to service.



1. SUPPORT
2. ATTACHING HARDWARE
3. DASH
4. STRAPS

Figure 5. Steering and Dash Assembly

Troubleshooting

PROBLEM	POSSIBLE CAUSE	PROCEDURE OR ACTION
Steering is rough or difficult.	Damaged, worn, or defective steering handle swivel bearing(s).	Replace bearings.
	Steering handle swivel bearing(s) need lubrication.	Lubricate or repack bearings.
	Bearing retaining nut torque incorrect (Top Mount Control Handle Only).	Loosen retaining nut and retorque to 19 N•m (26 lbf ft).
	Drive unit housing bearing (steer) damaged.	Replace drive unit housing bearing (steer).
Steering handle does not return to the vertical position.	Gas spring is weak or broken.	Replace gas spring.
	Gas spring ball stud broken or loose.	Retighten or replace gas spring ball stud.

NOTES

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