

## TABLE OF CONTENTS

|   |   |
|---|---|
| Introduction.....                                   | 1 |
| General.....  | 1 |
| Description of Operation .....                      | 1 |
| Special Precautions.....                            | 1 |
| Control Handle.....                                 | 3 |
| Remove .....  | 3 |
| Install .....                                       | 3 |
| Support Assembly .....                              | 5 |
| Remove .....  | 5 |
| Disassemble .....                                   | 5 |
| Repair .....  | 5 |
| Assemble .....                                      | 6 |
| Install .....                                       | 6 |
| Control Handle and Support Assembly (Complete)..... | 6 |
| Remove .....  | 6 |
| Install .....                                       | 7 |
| Troubleshooting.....                                | 9 |

This section is for the following models:

T5Z [A476];  
 T7Z [A477];  
 C60Z [A478];  
 C80Z [A479];  
 T5Z<sup>AC</sup> [B476];  
 T7Z<sup>AC</sup> [B477];  
 C60Z<sup>AC</sup> [B478];  
 C80Z<sup>AC</sup> [B479]

## Introduction

### GENERAL

This section provides a description of the steering system used on the T5-7Z, T5-7Z<sup>AC</sup>, C60-80Z, and C60-80Z<sup>AC</sup> lift trucks. Procedures for removal, disassembly, repair, assembly, and installation of the steering assembly are outlined in this section.

See the section **Electrical System** 2200 SRM 1052 or **Electrical System** 2200 SRM 1357 for information on removal and disassembly of the control handle.

See the section **Master Drive Unit** 630 SRM 961 for information on the traction motor, drive unit, or drive tire and wheel assembly.

See the section **Periodic Maintenance** 8000 SRM 1032 or **Periodic Maintenance** 8000 SRM 1368 for

instructions on removing and installing the Drive Unit Compartment Covers.

### DESCRIPTION OF OPERATION

The steering system consists of a top-mounted, fixed, tower-type control handle assembly, a support assembly, a steer plate, a Master Drive Unit (MDU), and the drive tire and wheel assembly. The operator moves the control handle assembly left or right to steer the truck. Direction and speed controls are located on the control handle assembly which is attached to the hub on the support assembly. The control handle assembly is adjustable. A spring-loaded pin locks it into position. The support is attached to the truck frame and houses a set of tapered roller bearings. The hub is attached to the upper end of the spindle. The steer plate connects the lower end of the spindle to the MDU and turns the MDU left or right when the control handle is moved to steer the truck.

## Special Precautions

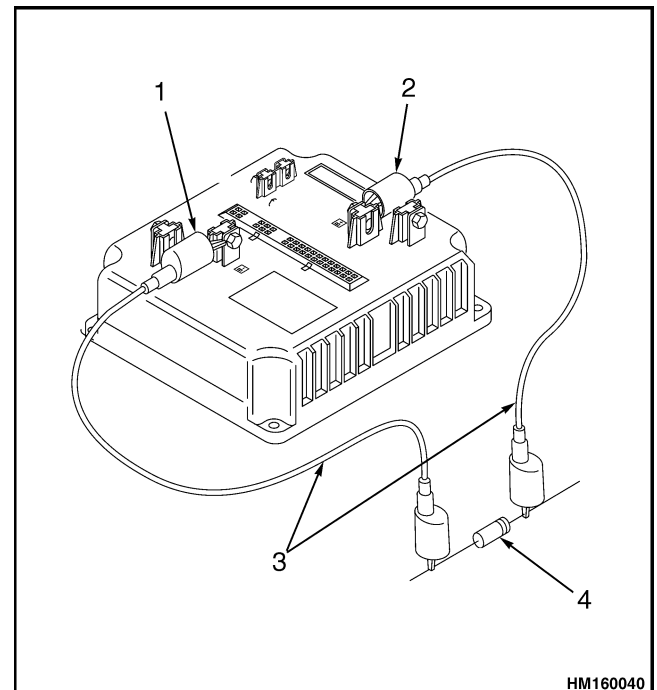
### WARNING

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 the proper procedure when servicing the controller.

1. Turn the key switch to the **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 or 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

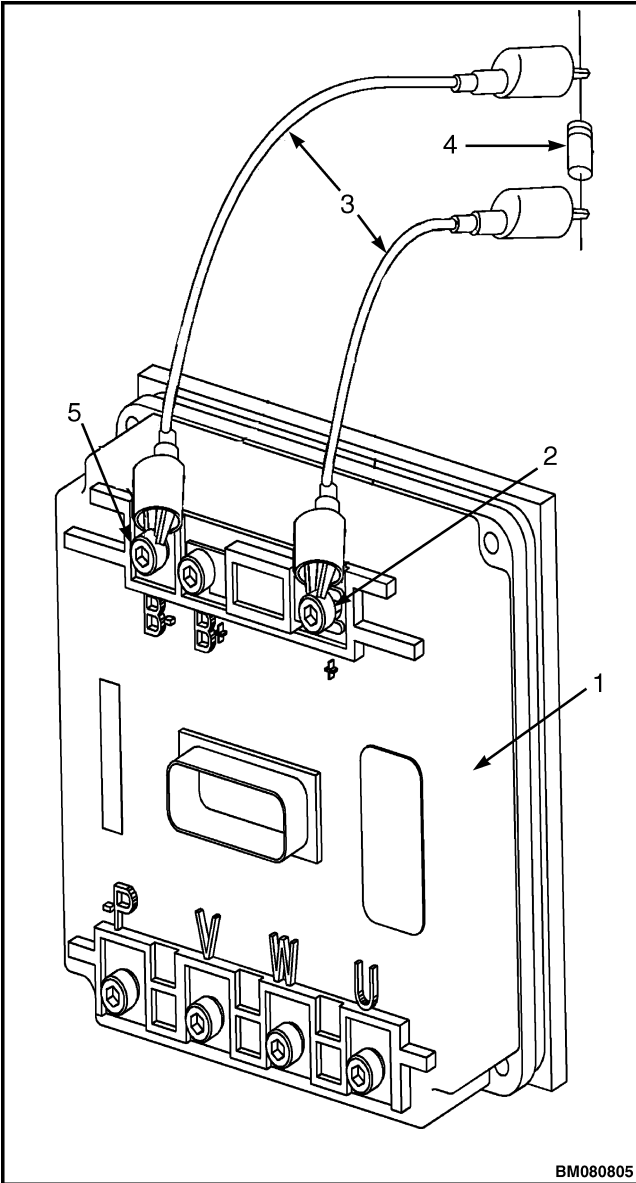
**Figure 1. Discharging the Controller (C60Z, C80Z, T5Z, and T7Z)**

(More Content includes: Brake system, Capacities, and specifications, Frame, Hydraulic, System, Industrial battery, Main control, Valve, Mast repair, Fasteners, Schematics diagrams, Steering axle, Steering system, Wire harness repair And more)

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*Legend for Figure 2*

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

**Figure 2. Discharging Controller (C60Z<sup>AC</sup>, C80Z<sup>AC</sup>, T5Z<sup>AC</sup>, and T7Z<sup>AC</sup>)**

## Control Handle

### REMOVE

1. Move the lift truck to a safe, level area.
2. Block the wheels to prevent the lift truck from moving. Refer to **Periodic Maintenance** 8000 SRM 1032 or **Periodic Maintenance** 8000 SRM 1368 - How to Put the Truck on Blocks.
3. Turn the key switch to the **OFF** position, set the parking brake to the **ON** position, and disconnect battery.
4. Remove drive unit compartment covers. See the section **Periodic Maintenance** 8000 SRM 1032 or **Periodic Maintenance** 8000 SRM 1368 - Drive Unit Compartment Covers.



### 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.**

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

For the following instructions, refer to Figure 3.

6. Raise handle to the upper adjustment position.
7. Remove three Allen-head screws (20) holding cover to hub and remove cover to gain access to control handle wiring harness.

**NOTE:** Pay special attention to where each wire tie and terminal of the wiring harness was removed for proper installation.

8. Label and disconnect control handle wiring harness from the control handle interface module. Label and disconnect the main wiring harness from the contactor, MDU and horn.
9. Gently pull control handle wiring harness through spindle and place wiring harness over to one side.

10. Support the handle with a sling and overhead lifting device. Remove roll pin (28) and pivot shaft (30) from hub.

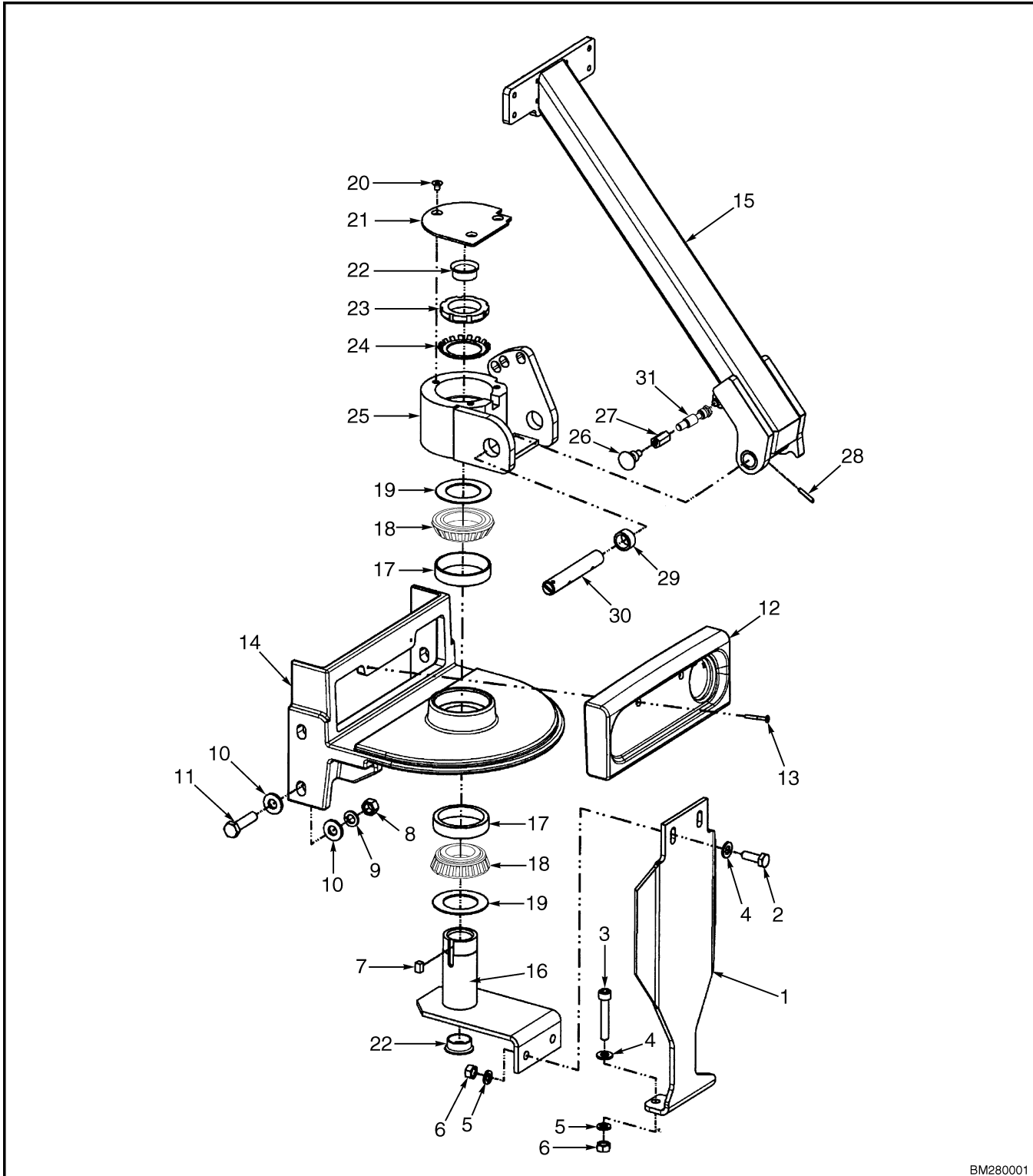
11. Disengage adjustment pin and remove control handle arm from the hub.

**NOTE:** If the pivot shaft does not fit snugly in the bushings, replace the bushings.

12. Remove bushings from hub if there is excessive clearance between the pivot shaft and bushings.

### INSTALL

1. Install bushings to hub, if removed. Pin should fit snugly in bushings.
2. Align control handle arm to hub. Retract the adjusting pin and position lower end of control handle between the lobes on the hub.
3. Insert pivot (shaft) and roll pin (28).
4. Pull control handle wiring harness through spindle and route wiring harness through large wire clamp on side of support and around back side of support as removed.
5. Secure wiring harness to top of motor mounting stud using wire clamp. Connect control handle wiring harness to the control handle interface module. Connect the main wiring harness to the contactor, brake, and horn as removed. Refer to the sections **Electrical System** 2200 SRM 1052 or **Electrical System** 2200 SRM 1357 and **Diagrams** 8000 SRM 1034 to aid in correct installation of control handle wiring harness.
6. Align cover to hub and install three Allen-head screws (20).
7. Connect the battery, turn the key switch to the **ON** position, and set the parking brake switch to the **OFF** position.
8. Remove blocks from wheels and test truck for proper operation.
9. Install the drive unit compartment cover. Refer to the section **Periodic Maintenance** 8000 SRM 1032 or **Periodic Maintenance** 8000 SRM 1368 - Drive Unit Compartment Covers.



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*Figure 3. Control Handle and Support Assembly*

*Legend for Figure 3*

- |                        |                                       |
|------------------------|---------------------------------------|
| 1. STEER PLATE         | 17. BEARING RACE                      |
| 2. CAPSCREW            | 18. BEARING                           |
| 3. CAPSCREW            | 19. SPACER                            |
| 4. WASHER              | 20. SCREW                             |
| 5. LOCKWASHER          | 21. COVER                             |
| 6. NUT                 | 22. SLEEVE, WIRE GUARD                |
| 7. KEY                 | 23. LOCK NUT                          |
| 8. NUT                 | 24. LOCKING WASHER                    |
| 9. LOCKWASHER          | 25. HUB                               |
| 10. WASHER             | 26. KNOB                              |
| 11. CAPSCREW           | 27. REDUCING NUT                      |
| 12. DASH               | 28. ROLL PIN                          |
| 13. CAPSCREW           | 29. BUSHING                           |
| 14. SUPPORT            | 30. PIVOT (SHAFT)                     |
| 15. CONTROL HANDLE ARM | 31. PLUNGER, NUT, AND SPRING ASSEMBLY |
| 16. SPINDLE            |                                       |

**Support Assembly****REMOVE**

1. Remove the control handle. Refer to Control Handle in this section.
2. Remove nuts, lockwashers, washers, and capscrews that hold the spindle to the steer plate.
3. Loosen capscrews securing the steer plate to the drive unit.
4. Attach a sling and an overhead lifting device to the support.
5. Remove nuts, lockwashers, washers, and capscrews that hold the support to the frame.
6. Remove the support using an overhead lifting device and place on a clean workbench.

**DISASSEMBLE**

1. Bend tabs on the locking washer (24) down, using a flat screwdriver. Remove the bearing lock nut (23) by turning counterclockwise. Remove the locking washer.
2. Remove the hub and key (7).
3. Remove the spindle, wire guard sleeves, and spacers (19).

**CAUTION**

To prevent damage to the bearings and bearing races, always use a soft-metal punch and hammer to lightly tap them out of the support.

**NOTE:** Under normal conditions it is not necessary to remove the bearing races from the support.

4. Remove bearings from the support.
5. Inspect the bearing races and replace if necessary. Remove using a soft-metal punch and hammer. Lightly tap the races out using a criss-cross pattern.
6. Clean all surfaces with solvent and replace any damaged parts.

**REPAIR****WARNING**

**Commercial cleaning solvents may be flammable and toxic and can cause severe skin irritation. When using commercial cleaning solvents, always comply with the solvent manufacturer's recommended safety precautions.**

Clean the bearing assemblies by washing them in solvent to remove all grease and dirt. When clean, the bearings 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 and race for pits or grooves. If any rough places are found, replace with a new bearing assembly.

**ASSEMBLE**

1. Install the bearing races into the support using a driver and press. Install one, turn the support over, and install the second.
2. Install the support to the frame using an overhead lifting device and a sling. Secure using four capscrews. Torque to 88 N•m (65 lbf ft). Install the large wire clamp to the lower capscrew on the side farthest from the controller as removed.
3. Pack the bearings with Hyster® synthetic grease, P/N 2074114, using a standard bearing packing device. Place a liberal coating of synthetic grease on the surface of the bearing races.
4. Install the wire guard sleeves (22) on spindle.
5. Install the spacer (19) and lower bearing (18) (taper up) on spindle.
6. Align the spindle with the support and insert through the support, being careful not to damage bearings.
7. Install the upper bearing (18) (taper down) and spacer (19) on the spindle.
8. Place the hub over the spindle. Align the grooves in hub and spindle and insert key (7).
9. Install the bearing locking washer (24) and bearing lock nut (23) to top of the spindle.
10. Tighten the bearing lock nut to seat the bearings, loosen the bearing lock nut, and torque to 27 N•m (20 lbf ft).
11. Bend the bearing locking washer tabs against the bearing lock nut.

**INSTALL**

1. Position the support to the lift truck frame.
2. Install four capscrews. Torque to 88 N•m (65 lbf ft).
3. Install the spindle to the steer plate.
4. Tighten the lower steer plate capscrews. Torque to 55 N•m (41 lbf ft).
5. Install the control handle assembly. See Control Handle.
6. Remove blocks, connect the battery, turn the key switch to the **ON** position, and set the parking brake to the **OFF** position.
7. Test for proper operation and install drive unit compartment covers. See **Periodic Maintenance** 8000 SRM 1032 or **Periodic Maintenance** 8000 SRM 1368 - Drive Unit Compartment Covers.

**Control Handle and Support Assembly (Complete)****REMOVE****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).

The following instructions are for removing the entire dash and control handle assembly without dismantling the assembly. This procedure is useful

when the dash and control handle must be removed for access to other parts of the lift truck.

1. Turn the key switch to the **OFF** position and disconnect the battery.
2. Remove the drive unit compartment covers. See **Periodic Maintenance** 8000 SRM 1032 or **Periodic Maintenance** 8000 SRM 1368 - Drive Unit Compartment Covers.
3. Discharge the capacitor. See Special Precautions in this section.



**NOTE:** Pay special attention to where each wire tie and terminal of the wiring harness was removed for proper installation.

4. Label and disconnect the control handle wiring harness from the control handle interface. Label and disconnect the main wiring harness from the contactor, MDU, and horn.
5. 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 4.
6. Remove the four capscrews, nuts, and washers that hold the steering support to the frame. Remove the two capscrews attaching the swivel to the steer plate.
7. Using the overhead lifting device, carefully remove the steering assembly from the truck.

## INSTALL

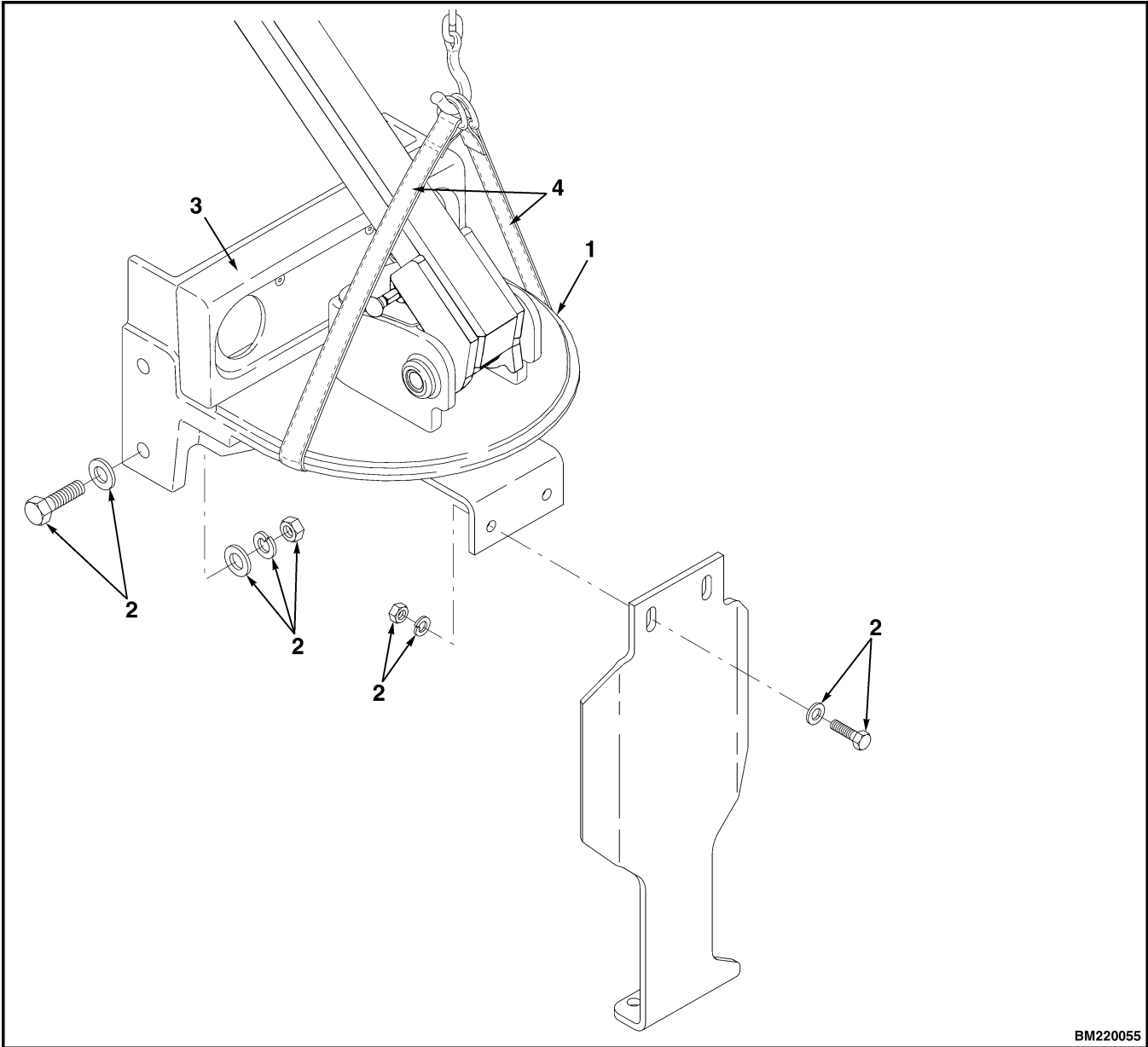
1. Secure one end of a rope or cargo strap around the steering assembly plate between the dash and the Control Handle assembly. Secure the other end to an overhead lifting device sufficient to lift at least 30 kg (66 lb).

## Control Handle and Support Assembly (Complete)

2. Using the overhead lifting device, carefully install the steering assembly and dash onto the truck.
3. Install the four capscrews, nuts, and washers that hold the steering support to the frame. Torque to 88 N•m (65 lbf ft).
4. Install the two screws attaching the dash to the support bracket.

**NOTE:** Pay special attention to where each wire tie and terminal of the wiring harness was removed for proper installation.

5. Connect the control handle wiring harness to the control handle interface module. Connect the main wiring harness to the contactor, MDU, and horn as removed.
6. Connect the battery and test for proper operation before returning to service.
7. Install the drive unit compartment covers. See **Periodic Maintenance** 8000 SRM 1032 or **Periodic Maintenance** 8000 SRM 1368 - Drive Unit Compartment Covers.



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- 1. SUPPORT
- 2. ATTACHING HARDWARE

- 3. DASH
- 4. STRAPS

**Figure 4. Control Handle and Support Assembly Removal**

## 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.                               | Loosen retaining nut and torque to 27 N•m (20 lbf ft). |
|                                 | Drive unit housing bearing (steer) damaged.                           | Replace drive unit housing bearing (steer).            |
|                                 | Incorrect caster adjustment. (C60-80Z and C60-80Z <sup>AC</sup> Only) | Adjust caster height.                                  |
|                                 | Caster damaged. (C60-80Z and C60-80Z <sup>AC</sup> Only)              | Replace caster.  |

