# AGV Maintenance Manual & Aftercare Services

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# 1. Inspection Intervals and Inspection Items

The proper functioning of an AGV (Automated Guided Vehicle) relies on careful maintenance. Neglecting maintenance can compromise safety and damage property. Regular inspections should be conducted to promptly address any anomalies, extend the AGV's service life, and ensure safe operation. AGV maintenance is typically categorized into four levels: routine maintenance, primary maintenance, secondary maintenance, and annual maintenance.

The maintenance, replacement of commonly used parts, and auxiliary materials need to be carried out by Party A.

## 1.1 Routine Maintenance (Weekly Maintenance)

1. Keep the vehicle's surface clean and undamaged. Ensure the laser radar lens and QR code camera lens are bright, free of dirt, and have no visible scratches.
2. Ensure the rubber pads on the top plate are securely adhered and undamaged.
3. Check that the AGV's lights are functioning normally and the sound warning system is working properly.
4. Verify that the emergency stop button, power on/off buttons, and other buttons are functioning correctly.
5. Ensure there is no water ingress on the AGV's surface or interior.
6. Confirm that the laser obstacle avoidance and collision strip are working properly.

Note: Do not use corrosive cleaners when cleaning. If the AGV is not used for an extended period, turn off the power and ensure the vehicle is not loaded. Do not modify program parameters during normal operation.

## 1.2 Primary Maintenance (Monthly Maintenance)

1. Ensure normal driving without deviation.
2. Verify that the upper and lower QR code cameras are working properly without missing codes.
3. Check that the lifting mechanism operates correctly, with no incomplete lifting, jamming, or abnormal noise.
4. Confirm that the rotation mechanism operates properly, with no incomplete rotation, jamming, or abnormal noise.
5. Ensure electrical components operate normally without abnormal heating or sparking.
6. Perform maintenance on the charging pile.

## 1.3 Secondary Maintenance (Quarterly Maintenance)

1. Mechanical Maintenance:
   a) Check for any loose fasteners on the vehicle.
   b) Ensures the wheels rotate freely, remove entanglements and dirt from the wheel bearings, and inspect the wheels for wear. Replace if necessary.

c) Check the charging pile's charging connector for solid contact and no deformation. Ensure the mechanism can automatically return to the center.
d) Remove dust from the vehicle's interior.

2. Lifting Mechanism Maintenance:
   a) Verify that the lifting mechanism operates normally for lifting and lowering and check the sensors and sensing plates for proper function.
   b) Check the rotation mechanism for normal operation and verify the sensors and sensing plates work correctly.
   c) Inspect the bolts on the lifting mechanism for looseness.
   d) Check the trapezoidal screw, nuts, and gear surfaces for wear; remove contaminants.
   e) Ensure the trapezoidal screw and gear assembly are adequately lubricated. If necessary, add No. 2 lithium-based grease

3. Electrical Maintenance:
   a. Battery status check and maintenance:
      i. Check the battery terminals for looseness or aging.
      ii. Inspect the battery connection wires for aging or wear.
      iii. Manually fully charge and discharge the battery for maintenance.
   b. Ensure all electrical connectors on the vehicle are secure and reliable.
   c. Inspect the insulation of switches, emergency stops, and laser radar.
   d. Verify the integrity of the vehicle's wiring harness.

## 1.4 Annual Maintenance

1. Complete Vehicle Maintenance:
   a. Clean the interior of the AGV chassis.
   b. Replace drive wheels or caster wheels based on mileage and wear.
   c. Check and adjust the radar tilt angle if it scans downward.

2. Lifting Mechanism Maintenance:
   a. Clean the surface of the screw and nut, then reapply No. 2 lithium-based grease.
   b. Clean the gear surface and reapply No. 2 lithium-based grease.

3. Charging Pile Maintenance:
   a. Check grounding continuity, clean the charger heatsink, verify internal wiring connections, and tighten foundation bolts.

# 2. Component Replacement and Repair Methods

## 2.1 Inspection and Replacement of Caster Wheels and Drive Wheels

1. Caster Wheel Inspection and Replacement:
    a) Tilt the AGV to one side (vehicle weight approx. 285kg). Use foam or soft materials on the lower side to prevent damage.
    b) Inspect the caster wheels for damage, excessive wear, and smooth rotation of the brackets. Replace if necessary.
    c) Remove the four screws fixing the caster wheels with a wrench, replace the wheels, and tighten the screws. Ensure the wheels rotate freely.
    d) After confirming correct installation, restore the vehicle to its original position.

2. Drive Wheel Inspection and Replacement:
    a) Remove the inspection covers on both ends of the chassis, push the vehicle, and inspect the drive wheels for damage or excessive wear. Replace if necessary.
    b) Lock the travel motor, loosen the six screws on the drive wheel, and power down.
    c) Disassemble the top plate, upper cover, and drive wheel guard sequentially.
    d) Lift the rear of the vehicle and support it with a block, ensuring the drive wheels or rear caster wheels are off the ground. Remove the screws fixing the drive assembly bearing and detach the rocker arm.
    e) Replace the drive wheel, ensure correct installation, tighten the screws, and verify smooth operation without jamming or jumping.
    f) Reassemble the drive assembly on the vehicle, power on, trigger the home sensor to stop the rotation mechanism, tighten the drive wheel screws, lower the vehicle, and remove the block. Check for normal operation and reinstall the top cover and plate.

3. Notes:
    a) Ensure at least two people are present when tilting the vehicle, with one person holding it to prevent tipping.
    b) Be cautious of the sensing plates under the top plate to avoid damage.
    c) Replace screws with excessive thread adhesive.
    d) Use a torque wrench to tighten screws on caster and drive wheels to standard values.
    e) Apply 242 thread adhesive to screws on caster and drive wheels and mark them to prevent loosening.

- Inspect caster wheels every six months and replace them if damaged.
    - For light loads, extend the replacement period.

- Replace all four caster wheels (or two drive wheels) as a set to maintain performance consistency for stable vehicle operation.

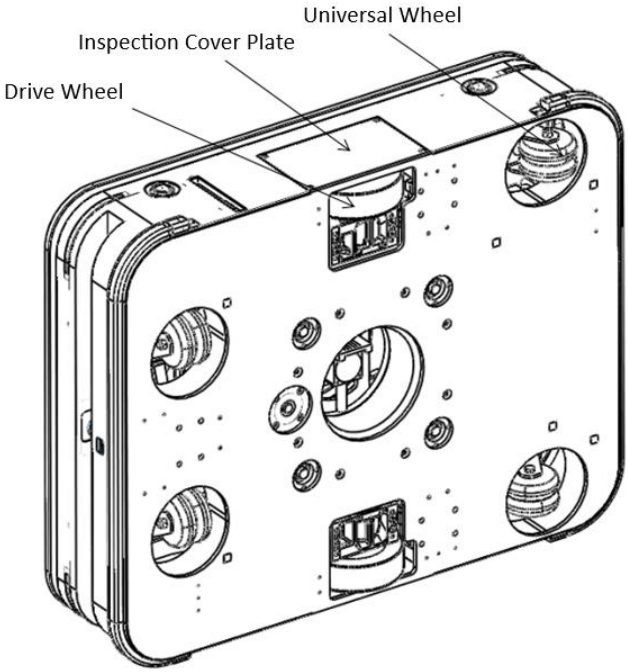


*Figure 1. AGV Tilting Diagram*



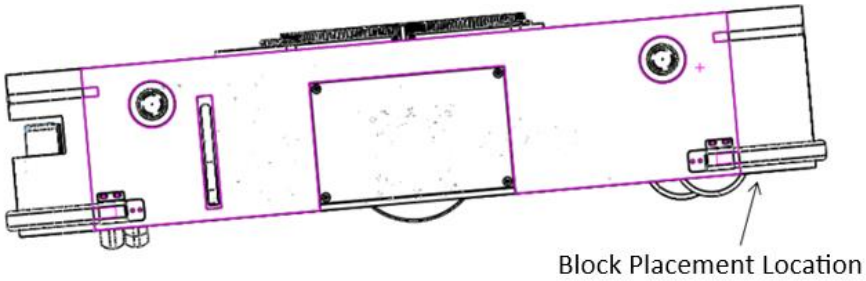


*Figure 2. AGV Drive Wheel Inspection Diagram*

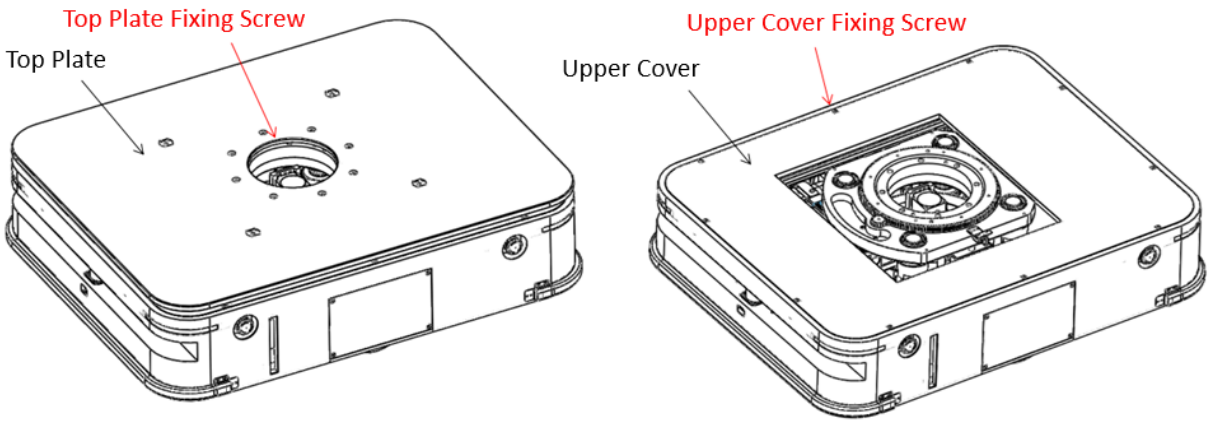


*Figure 3. AGV Top Plate and Upper Cover Diagram*

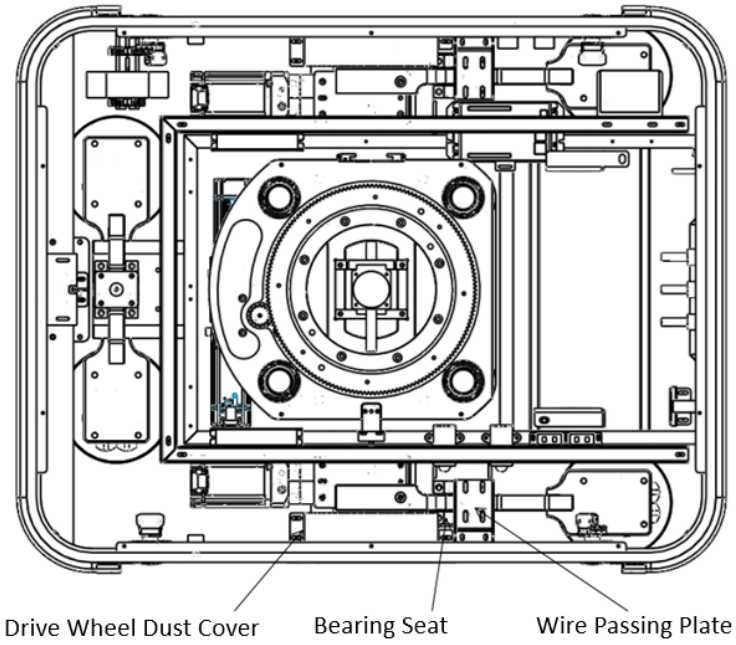


*Figure 4. Drive Rocker Arm Removal Diagram*

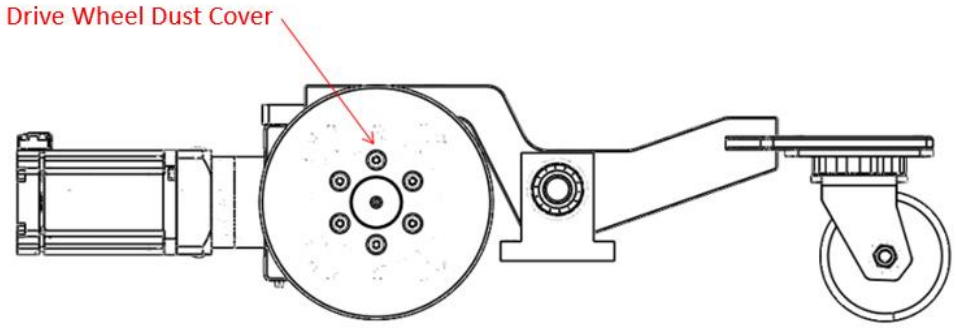


*Figure 5. Drive Rocker Arm Diagram*

### 2.2 Lifting Mechanism Inspection and Maintenance

1. **Lifting Mechanism Inspection:**
    a) Power on and operate the lifting mechanism to perform lifting and rotation movements. Observe the mechanism to ensure smooth operation without jamming or abnormal noise.
    b) Check the gear surface for any contaminants. Clean promptly if found.
    c) Inspect the gear surface for severe wear. Replace the gear if necessary.
    d) Examine the wear condition of the trapezoidal screw copper nut. If worn significantly, replace the entire trapezoidal screw assembly.

2. **Dust Removal and Lubrication:**
    a) Remove the top plate and upper cover.
    b) Use a lint-free cloth to clean contaminants from the gear surface and reapply No. 2 lithium-based grease. Rotate the gears fully and wipe off excess grease.
    c) Raise the lifting mechanism and use a lint-free cloth to clean contaminants and old grease from the trapezoidal screw surface. Reapply No. 2 lithium-based grease, operate the lifting assembly for two cycles, then clean the screw surface again.
    d) Reapply No. 2 lithium-based grease and operate the lifting mechanism for several cycles. Apply grease in small amounts multiple times, performing 3-5 lifting movements each time.
    e) After repeating the lubrication process at least three times, remove any excess grease to complete the lifting mechanism maintenance.

3. **Notes:**
    a) Perform all operations involving manual contact with the screw or gears with the power off to prevent injury.
    b) Be careful when removing the top plate to avoid damaging or deforming the sensing plates underneath.
    c) Leave a small amount of grease at the end of the trapezoidal screw to extend the lubrication intervals.

## General Tips

1. To enhance robot lifespan and efficiency:
    a) Adjust the robot cleaning frequency based on the cleanliness of the operating environment.
    b) Regularly clean the robot and ensure adequate lubrication.

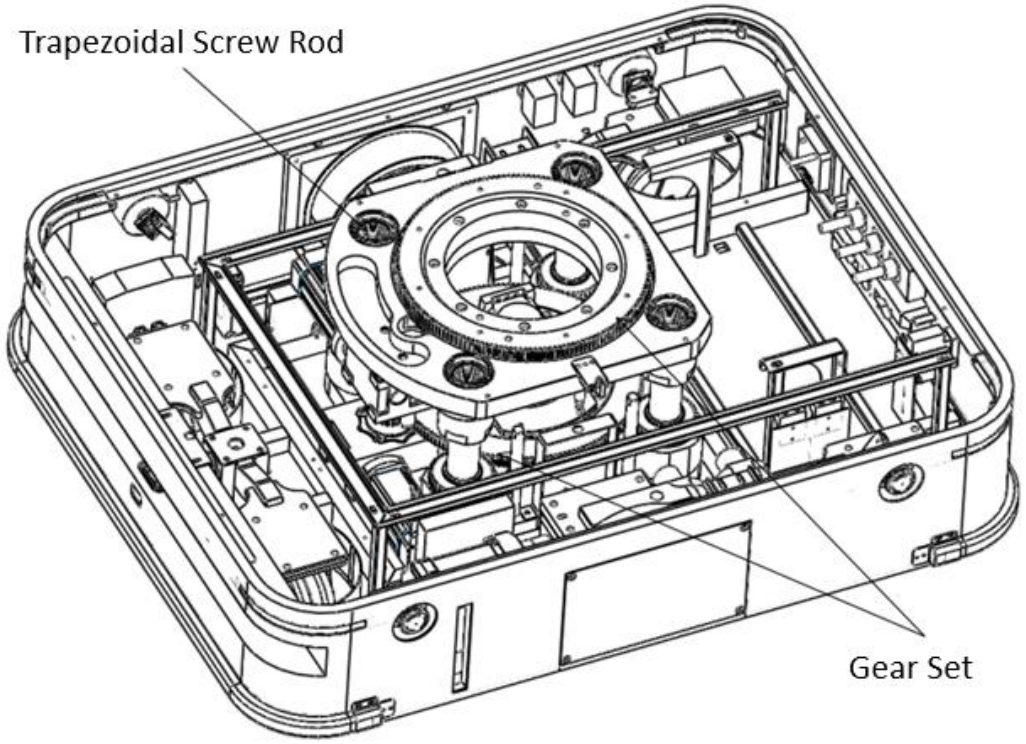


*Figure 6. Lifting Mechanism Cleaning Diagram*