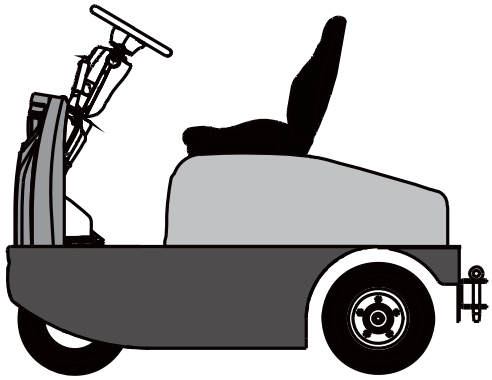
SERVICE MANUAL

CTX 40 / 70

Towing Capacity
: 4000 kg / 7000 kg



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Section 2

The Planned Maintenance Program

This Section defines a set of basic service procedures, known as the “Planned Maintenance Program,”and describes a systematic approach for performing them.

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Introduction to Planned Maintenance

A program of regular, routine inspections, lubrication, and other service tasks is important for the long life and troublefree operation of the truck.

The CLARK service organization offers customers a formalized program.called Planned Maintenance, or PM.for performing these tasks.

PM Intervals

The PM inspections, adjustments, and lubrications are typically performed on each covered truck at 50-250 hour intervals. (See Section 1, in this Group about defining service intervals.)

The PM Form

As an aid to service technicians performing and documenting PM inspections, CLARK has prepared a "Planned Maintenance Report" form. A copy of this form is inserted in Section 3 of this Group.

We recommend that you use this form as a checklist and to make a record of your inspection and truck condition. This record can be used to inform the owner of needed repairs and help establish the optimal PM intervals.

When you have finished the PM inspections, be sure to give a copy of the report to the person responsible for truck maintenance.

The Basic PM Procedures

The basic PM procedure is to perform checks first, repairs and adjustments last. As you go through each step of the PM, you should note all your findings on the PM report form.

The PM report form serves as a record of what you did in the PM and what further service needs to be performed. "Further service" consists of any repair, adjustment, inspection, or lubrication that you discovered during the PM or any periodic service procedure that is due but not covered by the PM agreement).

You should consult the previous PM report forms, periodic service chart, and truck hour meter to determine what periodic service is due. List the service due on the new PM form.

The PM procedure, in outline form, is as follows:

1. **External visual checks.** Perform these as you walk around the truck with it turned off.
2. **Operational checks.** Perform these while operating the truck.
3. **Internal visual checks.** Perform these after removing the floor board and cowl cover.
4. **Critical fastener torque checks.**
5. **Minor adjustments and repairs** you found in your inspection.
6. **Battery check and Recharging.**
7. **Chassis lubrication.**
8. **Final clean up.**
9. **Minor adjustments to the responsible party.**

Each of these steps is explained in detail beginning on the next page.

CAUTION

- **Do not make repairs or adjustments unless authorized to do so.**
- **Disconnect the battery before you work on electrical components.**
- **Always wear safety glasses.**
- **Wear a safety (hard) hat in industrial plants and in special areas where protection is necessary or required.**
- **Remove all jewelry (watch, rings, bracelets, etc.) before working on the truck.**

Truck Location and Parking

Before starting the external inspection, make sure the truck is parked on a clean, level surface. Turn truck off, and engage the parking brake.

If it is necessary to drive the truck to a suitable inspection location, perform the initial braking and steering checks, given later in this Section, as you begin to move the truck.

To perform the operational checks, the truck must be where there is sufficient room to maneuver the truck at full speed without endangering personnel, equipment, or materials.

External Inspection

Walk around the truck and take note of any obvious damage and maintenance problems, as follows:

Decals

Check to be sure all capacity, safety, and warning plates and decals are attached and legible.

NOTE

Do not operate a truck with damaged or missing decals and nameplates. Replace them immediately. They contain important information. See Group 40 for decal locations.

Fittings and Fasteners

Make sure that fittings and fasteners are present, in usable condition and fully fastened. Critical fastener torque checks should be performed later--when making minor adjustments and repairs.

Overhead Guard and Chassis

Be sure that the overhead guard and any other safety devices are in place, undamaged, and attached securely. Inspect welds and structural members for cracks or other damage.

Lights and Safety Devices

Check safety devices, such as lights, horn, and audible alarms, to make sure they are securely attached and have on visible damage.

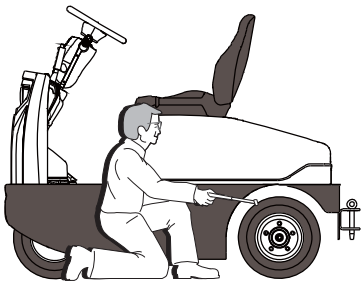
Leaks

Look under the truck and on the chassis, and exposed tubes for any signs of external leakage: brake fluid, drive axle oil, and battery fluid.

Wheels and Tires

Check the condition of the drive and steer wheels and tires. Remove objects that are embedded in the tread. Inspect the tires for excessive wear or breaks or “chunking out.”

Check all wheel lug nuts or bolts to be sure none are loose or missing. Have missing bolts or lug nuts replaced and tightened to correct torque as explained in Group 22.



WARNING

Check tire pressure from a position facing the tread of the tire, not the side. Use a long-handled gauge to keep your body away. If tires are low, the tire may require removal and repair. Incorrect (low) tire pressure can reduce truck stability. See “Specifications” in Group 22 for proper inflation pressure.

Operational Checks

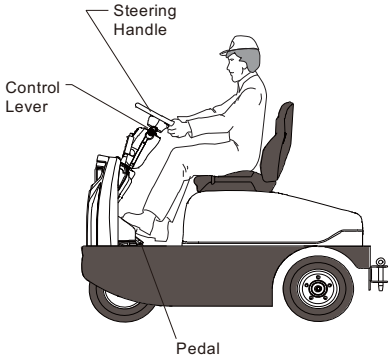
Be sure that:

- Truck is parked on a level surface.
- Key switch is off.
- Parking brake is applied.
- Directional control is in "N" (neutral).
- Battery is connected.

Operator’s Environment

Sit in the operator’s seat and make sure the seat is secure and that the seat adjustment mechanism operates properly.

With the key switch off, check that travel and load dash display, lights, and alarms are all disabled.



Check that the steering wheel is tight and rotates smoothly and adjusts for tilt properly. Check the foot pedals to make sure they are securely mounted, operate freely, and return to neutral when released.

Service and Parking Brake (Initial Check)

Push the brake pedal down fully and hold. The brakes should apply before the pedal reaches the floorplate. If the pedal continues to creep downward, report the failure immediately. Do not operate the truck until the brakes are repaired.

Operate the parking brake to make sure that it is securely mounted and that it applies, catches, and releases properly.

Apply the parking brake. Turn the key switch on.

Horn, Lights, and Alarms

Test the horn and headlights and other safety devices before moving the truck. Check backup alarms and lights and all other safety equipment as you drive the truck in the following steps.

CAUTION

If the service brake, parking brake, or interlock is not operating properly, take the truck out of service until it is repaired.

Traction and Braking System

Next, drive the truck to test the braking, accelerating, turning and reversing.

WARNING

Fasten your seat belt before driving the truck.

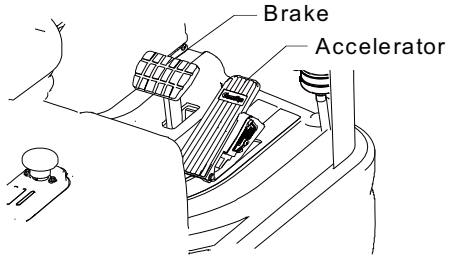
NOTE

After you move the truck, you can check where the truck was parked to see if there are any leaks.

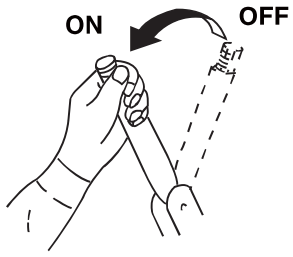
Brakes

Make sure that the truck is on a level surface, the travel area is clear in front of and behind the truck, the parking brake is released, the direction control is in neutral, and the key switch is on. The numerical display should show battery condition with the parking brake off.

1. Move the direction control lever from neutral to forward.
2. Check brakes at creep speed: Release the brake pedal and depress the accelerator pedal to obtain slow forward speed. Apply the brake pedal to ensure that the brakes are sufficient to stop the truck. Pedal should feel firm and drive motor should cut off before brakes apply.



3. Check brake pedal freeplay: Travel again and gently depress the brake the brake pedal. The pedal should drop a very slight distance before the brakes begin to apply.
4. Check brakes at full travel speed: Depress and release the brake pedal several times while driving the truck. The brakes should bring the truck to a smooth stop without pulling, squealing, or shuddering. Drive motor should cut off before brakes apply.
5. Check brake holding capability and adjustment: Park the truck on a grade and depress brake pedal. The brake should hold a truck with rated towed load on a 5% grade.
6. Check the function of the parking brake: Park the truck on a grade and apply the parking brake. The parking brake should hold a truck with rated towed load on a 5% grade. Also, when travelling at full speed, application of the parking or service brake should stop the truck in one truck-length.



Release Braking

Release Braking is the automatic slowing of the truck, using the drive motor as a generator, when you lift your foot from the accelerator.

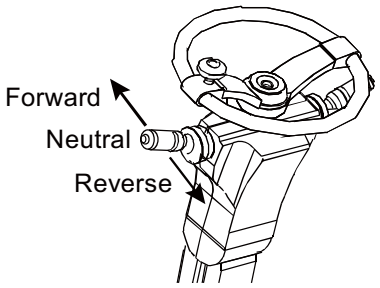
Accelerate to a Medium speed. Take your foot off the accelerator, truck should smoothly brake to a stop (distance depends on the RELEASE BRAKING setting).

When the truck is on a ramp and the accelerator pedal is released, the truck should brake to a stop and then continue the creep down the ramp at approx. 1 MPH.

See Section 19 for adjustment procedures for the Release Braking function.

Controlled Reversal

Accelerate to a slow speed and reverse the direction control without applying the foot brake. Truck should slow to a smooth stop then accelerate normally in the opposite direction.



Repeat in both directions at various speeds.

Acceleration

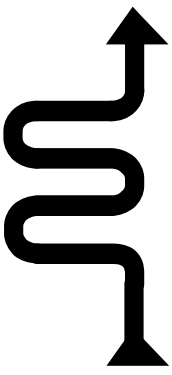
After checking to see that you have a clear path, check acceleration from a stand still condition. Drive the truck in a straight line at a high rate of speed. Acceleration should be smooth and without hesitation. Listen for unusual drive train noise. Repeat in opposite direction.

The accelerator pedal must move easily and smoothly throughout the acceleration stroke and return without binding. There should be no restriction to movement on acceleration or deceleration.

Turning

1. Drive the truck in a straight line. The truck must travel without drifting to either side.
2. Drive slowly (creep speed) through a series of full right and left turns. Check steering response and smoothness of operation.

Refer to Group 25 for steer system troubleshooting information.



Internal Inspection

The internal inspection involves accessing the truck's inner compartments, inspecting the various electrical and checking fluid levels.

You can perform much of the inspection as you air clean the truck, which is described later in this Section.

CAUTION

Remove all jewelry (watch, rings, bracelet, neck chains, etc.) before working on electric trucks. Severe burns can result from contact with electrical circuits.

Proceed as follows:

1. Park the truck on a level surface.

Discharging Controller Capacitors

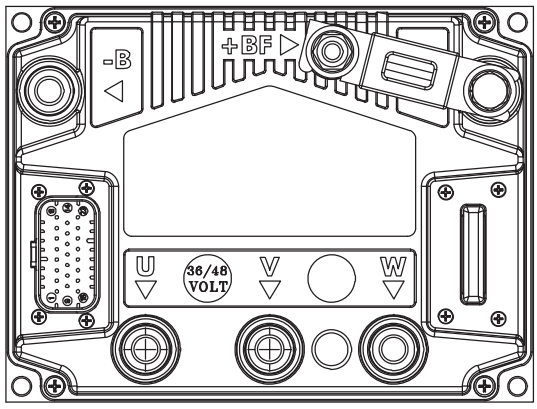
a. Turn off the key, put the direction control in neutral, and set the parking brake.
b. Disconnect the battery connector.
c. Turn the key switch on.

It is necessary to discharge the capacitors before you work on the controller.

NOTE

Make sure that the battery has first been disconnected at the battery receptacle.

To discharge the capacitors connect a 200 ohm 10 watt resistor between the positive and negative input post of the controller for 10 seconds.



General Checks

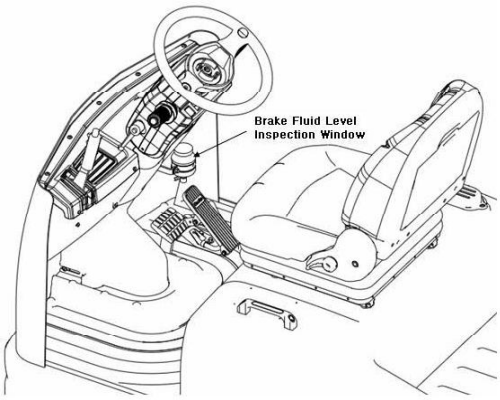
Look for:

- Pinched wires
- Frayed or broken cables
- Dirty or loose electrical connections
- Loose or bent linkage pins
- Signs of excessive wear or damage to linkages, hinges, lines, clamps, and fittings
- Leaks, (often indicated by dust or dirt built up) from drive axle and reservoirs and plumbing
- Loose or damaged fasteners and motor mounts.

Fluid and Filters

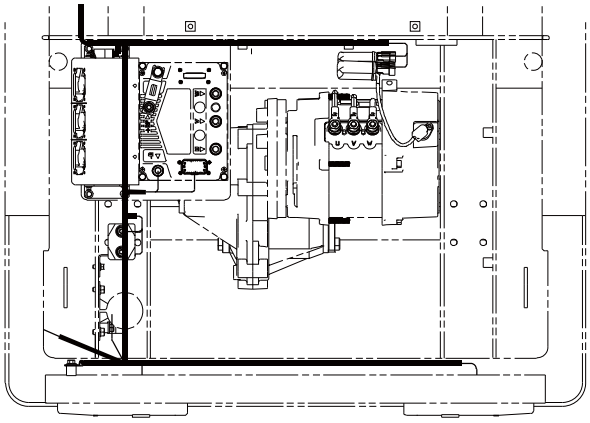
Brake Fluid

Using a flshlight, check **brake fluid** reservoir through inspection window. Fill to full mark, if low, with DOT 3 BRAKE FLUID. See Group 23 for procedure.



Controller Connectors

Pull connectors and lubricate terminals with CLARK Electrical Connector Grease, part # 2819910.



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Make sure all connections are tight.

Battery

Inspect the battery for any damage, cracks, leaking condition, etc. If the terminals are corroded, clean and protect them with CLARK Battery Saver (available from your CLARK dealer).

Check twenty four cells with your hydrometer as desribed in Group 12. A consistent reading among the twenty four cells indicates the battery is probably in good condition.

Perform the battery load test described in Group 12.

Air Cleaning the Truck

You must air clean the truck as you perform the internal inspection described earlier in this Section.

CAUTION

Wear suitable eye protection and protective clothing.

CAUTION

Battery must be disconnected and capacitors discharged before inserting air wand into truck compartments.

Use an air hose with special adapter or extension that has a control valve and nozzle to direct the air properly. Use clean, dry, low-pressure compressed air. Restrict air pressure to 30 psi (207 kPa), maximum. (OSHA requirement).

Use air pressure to:

- Blow air into all motor openings from various angles to remove dust.
- Blow off all switches, contactors, motor controls, and all compartment walls.
- Air-clean the drive axle, steering axle.

If air pressure does not remove heavy deposits of grease, oil, etc., it may be necessary to use steam or liquid spray cleaner. DO NOT clean electrical components with steam.

Minor Adjustments Covered by PM

As you performed your inspections, you noted all needed adjustments and repairs on the PM report form. Some of these items may be outside the scope of the PM and should be reported for additional service. At this point in the PM, however, you should perform certain adjustment and repairs, if needed. These include:

Switch Adjustments

If any action that is triggered or indicated by a switch does not occur at the right instant, check the switch adjustment. To adjust the switch, slightly loosen the mounting screws and slide the switch to appropriately advance or retard the point at which the switch trips. Retighten the screws. If switch or circuitry is defective, report this on the PM form as a further needed repair.

Parking Brake Adjustment

Adjust the parking brake at the caliper end. Loosen the jamb nut and turn the adjusting nut to increase (or decrease) the slack in the cable. Tighten the jamb nut.

The brake caliper should be fully released when the parking brake handle is in the off position and should be fully applied when the handle is fully back.

See Group 23 for detailed procedure.

Missing or Loose Fasteners

Replace/tighten missing or loose fasteners during the PM. This incudes bolts, cotter pins, cable ties, and so on.

Chassis Lubrication

Lubrication requirements are given on the truck's service decal (which is shown in Section 1 of this Group.)

At each PM, check the drive axle fluid and grease steer wheel.

Consult the service decal or periodic service chart to identify other lubrications that are due (for example, wheel bearings) and report these on the PM form.

Be sure to clean the grease fittings before lubricating. Remove the excess grease from all points after lubricating. Lubricate miscellaneous linkage as needed.

Critical Fastener Torque Checks

For safety, maintain correct torque on all fasteners of components that directly support, handle, or control the load and protect the operator.

Check torque of critical items, including:

- Drive axle mounting
- Drive and steer wheel mounting
- Drawbar mounting
- Overhead guard mounting (if installed)

Critical fastener torque specifications are given in the general specifications Section of Group 40.

Wrapping Up the PM

Clean Up

Before closing up the truck, wipe up any spilled fluids and hand prints you may have left.

After closing up the truck, wipe off any handprints, drips, spills, or other blemishes caused by the PM. It's a good practice to leave the truck looking noticeably better than when you started.

Clean up any spills or debris you left on the floor or other surfaces.

Test the Truck

Operate the truck one last time to ensure that you identified all problems and that your repairs/adjustments were successful.

Report the PM

Finish filling out your PM form, making sure you noted everything you checked, all the problems you found, and all the items you adjusted or repaired.

Take the PM form to the person responsible for truck maintenance, present your results, discuss any problems, and point out where further service is needed.