

## CHAPTER 4 - CARE AND MAINTENANCE

### 4.1 CARE AND MAINTENANCE

#### 4.1.1 GENERAL

TDOT has a large investment in surveying equipment and survey parties are expected to protect that investment by exercising proper care. Surveying equipment is made to withstand normal use, but it cannot be expected to perform accurately if it is misused. Therefore, every piece of equipment shall be used only for the purpose it was designed. The person in charge of the survey crew is personally responsible for the care and maintenance of survey equipment assigned to his work unit. Any employee who does not at all times show proper regard and care for survey equipment may be suspended or dismissed. The following are guidelines for use, care, and everyday maintenance:

#### 4.1.2 TOTAL STATIONS AND LEVELS

- The instrument should be attached to the tripod snugly, but not so tight that the tripod head or spring plate becomes warped.
- The instrument should be held by the standards and tribrach (if applicable) when placing it on the tripod, not by the telescope or other parts.
- Lenses should not be touched with fingers. Lens cleaning fluid and eyeglass tissue, or a camel's hair brush should be used for cleaning.
- The instrument should be kept free of dirt and grease. If foreign matter is allowed to accumulate, it will eventually penetrate into the motions and cause sticking. The plastic hood should be used to protect the instrument in dusty conditions.
- The instrument should be kept dry. However, if it does get wet, it should be air-dried.
- An instrument should never be left unattended.
- The instrument should be in its carrying case when transported in a vehicle or when walking long distances, and never transported in a vehicle on one's lap or left on the tripod. Transporting equipment mounted on tripods can cause maladjustment and damage.
- When using the motions of the instrument, they should be clamped just enough that rotation about the axis will not occur with slight pressure. Motions shall never be forced. The instrument should be rotated gently with the fingertips rather than forcefully with a grip. If screws or motions operate too tightly, adjustments should be made. No part of an instrument should be removed, or adjustments made, without thorough knowledge of the procedures involved.
- When placing the instrument back in its case, it should be positioned and secured properly with the motions clamped lightly.

#### 4.1.3 TOTAL STATIONS

- Total Stations should be loaded in vehicles so movement and jarring is minimized.
- Required maintenance is minimal on most instruments. However, protection from the elements and routine external cleaning are necessary.
- A total station should never be pointed directly at the sun. The focused rays of the sun can damage receiving elements.
- Prisms should be kept in their cases when not in use.

- Prisms must be kept clean to assure maximum reflection.
- When prisms are set up near a high-speed road or in a strong wind, they must be secured so they will not blow over.
- Between setups, total stations should be transported in their storage / carrying cases.

**4.1.4 TRIPODS, LEVEL RODS AND OTHER EQUIPMENT**

- Tension should be kept on tripod legs so they will just fall freely.
- Mud shall be cleaned from tripod shoes and legs at the end of each workday, and dirt and mud cleaned from level rods and range poles as needed.
- Tripods, level rods, or other equipment should never be thrown into a vehicle or leaned against vehicles, trees, or buildings. Level rods should be laid flat or held vertically. Tripods should rest with the legs spread and firmly set in the ground.
- Clamps on extendable leg tripods should be just tight enough to avoid slippage.
- Other material (stakes, axes, etc.) should not be loaded on top of tripods, level rods, range poles and other such equipment.
- When walking, level rods should be carried with the numbers facing in or out (not up or down), so the rod does not bounce or bend while being carried.
- Level rods, range poles or other equipment should not be used for unauthorized purposes such as prying, vaulting, hammering, digging, prodding, etc.
- The moving parts and clamps of tripods, level rods and other equipment shall be oiled occasionally. Also, screws and bolts shall be checked periodically for tightness to assure rigidity.

**4.1.5 GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS) EQUIPMENT**

- Refer to manufacturer’s recommendations for detailed care and maintenance.
- Most GNSS equipment is water resistant and not waterproof.
- Over charging protection is typically built into the equipment.
- If using an RTK base station, place the base station on a point that is not likely to be in danger of being hit by a vehicle.
- When relocating to a different project area to work, take care in placing the rover rod with GNSS receiver in the vehicle to avoid damage.
- Occasionally, the receiver’s NVRAM may need to be cleared to eliminate communications or tracking problems.
- The moving parts and clamps of tripods, rover rods, and other equipment shall be oiled occasionally. Also, screws and bolts shall be checked periodically for tightness to assure rigidity.

**4.1.6 OFFICE EQUIPMENT**

Calculators, computers, etc., should be covered when not in use. Instruments such as planimeters, thermometers, hand levels, etc. should be kept in their boxes in a safe place.

**4.2 ADJUSTMENTS**

All survey equipment, including hand levels, planimeters, rods, etc., should be checked at frequent intervals to assure accuracy.

As a general rule, TDOT personnel should not attempt instrument repairs. However, competent and qualified personnel may perform minor repairs.

Adjustments can be classified as field or shop adjustments. Shop adjustments are made at the time of manufacture or during shop repairs.

The person in charge of the survey crew and Instrument Person shall know how to make field adjustments on levels and other equipment. This includes peg testing the level, leveling bubbles and centering cross hairs in the level.

When field adjustments become necessary, refer to the manufacturer's instructions for testing and adjusting.

Shop repairs or adjustments requiring expenditure of funds shall have prior approval by the Regional Survey Supervisor.

Instruments may be tested for distance and angle measuring accuracies by occupying points of known location.

### 4.3 SUPPLIES

The TDOT Limited Version of the Standard Financial Procedures Manual explains in detail the available sources and required procedures to obtain supplies. The following is offered as an aid in using that manual:

- Claims for incidental and emergency expenses (Refer to Form DT-0108 on page A-29 of the Appendix).
- Transfer or disposition of fixed assets (Refer to Form DT-0302 on page A-30 of the Appendix).
- Requisition for Garage Stock Room (Refer to Form DT-0125 on page A-32 of the Appendix).
- Requisition for Office and Engineering Supplies - from the Regional Stock Room (Refer to Form DT-0124 on page A-33 of the Appendix).
- Form DT-0607 is used for returning materials and supplies to inventory (Refer to form on page A-34 of the Appendix).
- In the event equipment is destroyed, lost or stolen, the proper form (F-303) may be obtained from the Regional Office to report the event and process the removal of these items from the fixed assets inventory report (DT-302). All thefts should be reported to the police. Sample forms may be found on pages A-35 and A-36 of the Appendix, respectively.

Specific companies to the State supply certain items under contract. These items must be purchased from the specified vendor. Any question as to whether an item is on contract shall be directed through the Regional Surveys Office to the Procurement Officer in the Region.

The purchase of supplies from outside vendors, requisitions from the Regional Garage Stockroom, requisitions from the Regional Stock Room or the transfer or disposition of fixed assets shall have prior approval by the Regional Survey Supervisor.