

REF: 000-100-200	117-200-006	205-010-501	237-200-203
007-005-015	117-300-002	205-010-502	237-200-204
009-026-300	122-205-001	205-010-701	740-100-073
026-100-500	122-205-003	205-705-201	742-100-100
075-190-100	200-001-010	220-000-200	742-100-101
075-190-105	205-000-500	220-001-001	742-100-102
075-676-100	205-001-500	220-101-104	795-805-071
117-200-002	205-005-100	237-050-200	795-805-072
117-200-004	205-005-101	237-050-204	795-805-073
117-200-005	205-005-200	237-200-202	795-805-074
			795-805-075

# Safety Precautions – Central Office

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## 1. General

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- 1.1 Purpose** This practice describes safety procedures and precautions to help prevent accidents by employees when working in or visiting central offices (COs) or PABX locations.
- 1.2 Filing Instructions and Supersedures** Discard all previous issues and associated addenda of this practice and file this issue numerically in your GTE Telephone Operations practices set.  
This practice supersedes:
- All local practices, policies, procedures, general instructions, letters, and memoranda which address this subject.
  - Any document which provides information contrary to the information contained in this practice.
- 1.3 Reason for Reissuing** This practice has been reissued to incorporate multiple changes in the content. Read this entire practice to ensure your familiarity with the new information.
- 1.4 Responsibility** This practice was published by the GTE Telephone Operations Administrative Services Department. For more information about this practice, contact the Headquarters COE Construction Department.
- 1.5 Disclaimer** This practice has been prepared solely for the use of GTE Telephone Operations. It must be used only by its employees, contractors, customers and end users, when installing, operating, maintaining, and repairing GTE Telephone Operations' equipment, facilities and services. Any other use of this practice is forbidden. The information contained in this practice may not be applicable in all circumstances and is subject to change without notice. By using this practice the user agrees that GTE Telephone Operations will have no liability (to the extent permitted by applicable law) for any consequential, incidental, special, or punitive damages that may result.

## 2. Safety Considerations

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### 2.1 Overview

No attempt has been made in this practice to cover every possibility. The extent to which persons may expose themselves to danger depends largely on:

- Existing conditions.  
AND
- Their:
  - Training.
  - Experience.
  - Mental attitude.

Precautions not covered in this practice may be necessary because of variations in:

- Types of equipment.
- Weather conditions.
- Geographical conditions.

The most important requirements of safety are planning and thinking before starting a job.

### 2.2 References

The following documents are referenced in this practice, and could be required for performing certain related tasks.

<b>For Information About...</b>	<b>See Practice...</b>
Warning Signs – Description and Installation	000-100-200
Handling Static-Sensitive Components	007-005-015
Lockout/Tagout Safety Procedures	009-026-300
Grasshopper Fuse Operation/Inspection	026-100-500
Lineman's Rubber Gloves and Rubber Blankets – Description, Use, and Care	075-190-100
Protective Gloves – Description and Use	075-190-105
Eye Protection – Description and Use	075-676-100
Hazard Communication Program	117-200-002
Tower Climbing Safety	117-200-004
Safety Hats – Description, Use, and Maintenance	117-200-005
Asbestos Work Procedures	117-200-006
First Aid Kit Description, Placement, and Inspection	117-300-002
Battery Removal and Disposal	122-205-001

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## 2. Safety Considerations, continued

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### 2.2 References, continued

For Information About...	See Practice...
PCB: Disposal of Capacitors and Light Ballasts	122-205-003
Guidelines for the Use of Electrical Tools and Test Equipment in Electronic Equipment Rooms	200-001-010
Power Connections, Central Office-- Inspection and Tightening Procedures	205-000-500
Power Complex Installation and Acceptance Test Procedures	205-001-500
Central Office Equipment Battery Maintenance Safety Board	205-005-100
Emergency Eyewash/Chemical Burn Station Description	205-005-101
Batteries -- Central Office and PABX -- Installation and Maintenance	205-005-200
Telephone Storage Batteries -- Discharge Tests for Ampere-Hour Capacity	205-010-501
CO and PABX Batteries -- Method of Determining Reserve Capacity	205-010-502
CO and PABX Lead-Acid Batteries -- Single Cell Charging -- Constant Current Method	205-010-701
Power Plant Bus Bar Installation	205-705-201
Equipment Removal Guidelines -- COE	220-000-200
Central Office Equipment Installation Activity Procedures	220-001-001
Solvents, Lubricants, and Cleaners -- Form S6890 -- Authorized List	220-101-104
Cabling Methods -- Central Office Method of Closing Cable Holes	237-050-200
Central Office Erection Methods	237-050-204
Rolling Ladder Track and Rolling Ladders -- Installation	237-200-202
Rolling Ladders Equipped with W.E. Co. Type Brakes -- Adjustment	237-200-203

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## 2. Safety Considerations, continued

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### 2.2 References, continued

For Information About...	See Practice...
Ladder, Rolling – Lubrication and Inspection	237-200-204
LABERM Cable Entrance and Vault Structural Details	740-100-073
Fire Prevention and Protection Guide	742-100-100
Fire Apparatus – Buildings – Description, Use, Placement, Maintenance	742-100-101
Emergency Procedures – Fire Apparatus – Central Office	742-100-102
Central Office Grounding Systems Engineering Applications	795-805-071
AC Service Grounding – Engineering Applications	795-805-072
Central Office Grounding Transmission Equipment	795-805-073
Inspecting Central Office Grounding and Electrical Protection	795-805-074
Remote Electric Serving Area Grounding System Engineering Considerations	795-805-075

### 2.3 Accidents – Causes and Prevention

Accidents are frequently the result of:

- Hurried, unsafe acts or shortcuts.
- OR
- Decisions not based on a thorough knowledge of the equipment and its potential hazards.

To help prevent accidents, all employees must:

- Use all the safeguards provided.
- **Not** take chances or assume anything to be safe.

When there is any doubt about the safety of an activity, object, or piece of equipment, check with a supervisor before proceeding.

Supervisors are responsible for observing their employees' equipment and working habits.

When noting unsafe equipment or working habits, the supervisor must make prompt corrections and give adequate instructions and training to reduce the possibility of accidents.

## 2. Safety Considerations, continued

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### 2.4 First Aid Supplies and Procedures

First aid supplies must be available in CO and PABX areas in accordance with GTE Telephone Operations Practice 117-300-002.

Employees must be trained in the proper use of first aid supplies. Where appropriate, train employees in

- Basic first aid procedures.
- Cardiopulmonary resuscitation (CPR) or artificial respiration.

### 2.5 Reporting Accidents and Unsafe Conditions

When an accident occurs:

- Follow local procedures for medical care of the injured.
- Promptly prepare any necessary reports.

All employees must promptly report to their supervisors:

- All accidents, regardless of their severity.
- Any unsafe condition or practice that could cause an accident.

## 3. Equipment Rooms

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### 3.1 Common Hazards

Common safety hazards found in the CO and PABX equipment rooms include:

- Slipping and tripping hazards on floors and working surfaces created by obstacles (e.g., tie wraps, wire, etc.) and electric power cords in aisles.
- Working on rolling ladders.
- Experiencing electrical shock from:
  - Bus bars.
  - Frayed power cords.
  - Ungrounded tools and equipment.
  - Exposed energized electrical conductors.
- Exposure to combustible and/or toxic vapors and/or gases from:
  - Solvents.
  - Lubricants.
  - Cleaners.
  - Battery electrolyte.

## 3. Equipment Rooms, continued

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### 3.2 General Precautions

Prior to entering the work area, persons involved in installation activity must remove metal objects or jewelry (e.g., rings, watches, bracelets, large belt buckles) that may come in contact with electrical components or become entangled with the hardware normally used in installation activity. Other Switching Facility personnel must remove such items prior to working in and around switchroom equipment.

When working in an area where both feet cannot be placed on the floor, use a suitable ladder. Do **not** stand on:

- Chairs.
- Frame horizontal blocks.
- Chair foot rails.
- Guard rails.
- Improvised structures.

To maintain a safe work environment, make sure that:

- Nothing in the equipment room or the switchroom violates safety policy.
- The OSHA poster is prominently displayed.
- The Authorized List of solvents, lubricants, and cleaners is conspicuously displayed in the work area. (Refer to GTE Telephone Operations Practice 220-101-104.)
- First aid kits are mounted, adequately supplied, and inspected monthly. (Refer to GTE Telephone Operations Practice 117-300-002.)
- Material Safety Data Sheets (MSDSs) are available to all employees in their work areas for chemicals and/or solvents used in the CO or PABX location.
- Emergency telephone numbers (i.e., fire, police, and medical) are posted in conspicuous locations.
- The emergency exit route for multi-story and complex one-story buildings is posted.
- "Exit" signs are posted at exits.
- The routes to exits are identified and free from obstruction.
- Doors that can be mistaken for exit doors are marked "Not an Exit" or are labeled so that they cannot be mistaken for exits.
- All lights, including emergency lights and illuminated "Exit" signs, are operating properly.

**NOTE: Illumination levels must be adequate for the type of work performed.**

- Equipment stored in the central office is covered with approved flame-retardant, waterproof tarpaulin.
- Locations where equipment and/or materials create a potential safety hazard are identified with a suitable means of hazard identification (e.g., caution tape, safety cones, or rope barriers).
- Building evacuation procedures are reviewed with employees every six months.

## 3. Equipment Rooms, continued

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### 3.2 General Precautions, continued

- The emergency exit route and the meeting location outside the building are known by all employees. Exit route diagrams must be posted in strategic locations in all multi-story buildings. (Refer to GTE Telephone Operations Practice 742-100-102.)
- Goggles (Item ID 579048), safety glasses/ANSI (American National Safety Institute) approved corrective lenses with side protection shields (Item ID 670004), or an equivalent are worn by employees when soldering, handling wire ends, and cutting wire or cable.
- Storage shelves are secured to the wall to prevent toppling.
- The tops of storage cabinets are **not** used for any type of storage.
- Mechanical rooms, furnace rooms, and battery rooms are **not** used for any type of storage.
- All doors in fire walls and fire partitions are equipped with an automatic door closer without a hold-open device. Doors are kept in the closed position at all times.
- An adequate number of fire extinguishers are placed and marked for location. Refer to GTE Telephone Operations Practice 742-100-101 for guidelines.
- Apparatus and equipment covers are placed where they will not endanger other employees. Replace the covers on the apparatus or equipment as soon as work permits.

**NOTE: When repairing defective equipment, do not leave covers on top of installed equipment or on the floor.**

- Cabinet doors are kept closed except when working on equipment in the cabinet. Do **not** store tools or supplies on equipment cabinet tops.
- All open key shelves are braced.
- All portable objects which must be placed in locations where they could fall are securely fastened.
- An awareness of asbestos and potential health risks exists. Refer to GTE Telephone Operations Practice 117-200-006.
- Prior to using any electrical tools and test equipment, refer to GTE Telephone Operations Practice 200-001-010.

### 3.3 Patch and Handset Cords

Use care when handling patch cords and the cords attached to the operator's or attendant's handset. The plug may become a dangerous object if swung around uncontrolled. **Always** obey the following rules.

- **Never** swing cords.
- **Always** grasp the plug as well as the cord when removing cords and plugs from jacks or cord hooks.

### 3.4 Testing Generator Circuits

When testing generator circuits with a test receiver, keep the receiver away from the ear to prevent ear drum injury.

## 3. Equipment Rooms, continued

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### 3.5 Clothing Requirements

Do **not** wear sandals or open-toed shoes. Wear shoes that cover the toes and provide good footing and support.

Do **not** wear loose metal accessories (e.g., chains, watches, rings, etc.).

When working on or around "hot" equipment, do **not** wear wire rim (metal frame) corrective lenses without wearing safety goggles over them.

CO Equipment Maintenance and Construction employees must wear approved safety hats when working in or near any of the following activities.

- Placing or removing:
  - Bus bars.
  - Superstructure.
  - Frame verticals.
  - Relay racks.
  - Equipment bays and shelves.
- Raising or lowering equipment from buildings.
- New building construction.

**NOTE: Wear approved safety hats when local supervisors feel the situation and conditions require it. (Refer to GTE Telephone Operations Practice 117-200-005.)**

CO Maintenance and Installation employees must wear approved safety glasses/goggles when:

- Soldering.
- Drilling.
- Cutting/trimming wires and tie wraps.
- Working with battery electrolyte solution.

**CAUTION: When working with battery electrolyte solution, only goggles are permitted.**

**NOTE: Refer to GTE Telephone Operations Practice 075-676-100.**

### 3.6 Smoking Restrictions

Do **not** smoke in equipment rooms. Post "No Smoking" signs in all equipment areas and strictly enforce the rule. Opening an equipment room exit door and smoking while standing in the open doorway is **not** permitted.

## 3. Equipment Rooms, continued

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### 3.7 Protecting Work Areas

To protect employees and the general public in work areas where equipment is loaded, unloaded, or moved, proceed according to the following instructions.

- Before starting any work, place traffic cones in the street, alley, parking lot, etc., to clearly identify the work areas.

**NOTE: If the street is blocked, place "MEN WORKING" signs in addition to the cones.**

- When using a building power hoist, place warning signs across each doorway leading to the hoist.

**NOTE: Place warning devices so they do not create hazards for pedestrians.**

- If the opening in the side of the building is more than four feet above ground level, the employee(s) working at the opening must wear a safety belt with lanyard attached to substantial structure.
- **Always** wear a safety hat when working in the area below the hoist. **Never** stand directly below the load.

### 3.8 Fire Prevention and Detection Equipment

Maintain fire prevention and protection standards at all times. Company rules and regulations apply equally to installers and company personnel. Refer to GTE Telephone Operations practices in the 742-100-XXX series.

Do **not** obstruct safety equipment; e.g., fire extinguishers. Do **not** move safety equipment without permission from the switching services supervisor, unless it is to be used for the intended purposes.

Keep all cable holes (vertical and horizontal) closed when associated cabling operations are not in progress. Close all cable holes with the approved materials at the end of each working day as specified in GTE Telephone Operations Practice 237-050-200.

**NOTE: The flame retardant treated plywood must have an Underwriters Laboratories (UL) rating of 25 or less for flame spread and smoke generation.**

Observe all fire precautions and make sure that:

- All employees know how to operate and use each type of fire extinguisher.

**NOTE: Review training and information with employees every six months.**

- The fire detection system manual, drawings, related GTE Telephone Operations practices, and inspection forms are stored in the metal container next to the control panel.
- Systems with multi-zones have zone diagrams posted next to the control panel and the annunciator panel, if so equipped.
- Nothing is stored in a horizontal plane within 18 inches of the sprinkler heads.
- Fire extinguishers are not obstructed.
- Fire extinguishers are not moved without permission of the switching services supervisor, unless they are used for the intended purpose.
- An adequate number of fire extinguishers are placed and marked for location(s) on the emergency evacuation drawing.
- Fire doors, including those to Halon-protected areas, remain closed at all times.

## 4. Battery Safety Precautions

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### 4.1 Potential Hazards

Consult GTE Telephone Operations Practice 205-005-200 for a comprehensive list of instructions and precautions when installing and maintaining batteries.

All batteries have three main potential hazards, as described in the following chart.

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Potential Hazard	Prevention
Voltage (current)	Take all necessary precautions to avoid contact with hazardous voltage.
Hydrogen gas emissions	Provide adequate ventilation to prevent a potential explosion hazard that can occur when hydrogen gas accumulates near battery vents or ceilings.
Battery acid (electrolyte)	Avoid spilling or splashing electrolyte on the skin and clothing or in the eyes. Electrolyte will: <ul style="list-style-type: none"><li>● Burn the skin.</li><li>● Dissolve clothing.</li><li>● Cause potential loss of eyesight.</li></ul>

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### 4.2 No Smoking

Do **not** smoke in battery rooms. Post "NO SMOKING" signs in all battery areas.

### 4.3 Specific Gravity Readings

**WARNING: Never remove the cell's explosion resistant venting device to take specific gravity or temperature readings.**

After taking specific gravity readings, place a gloved finger over the end of the hydrometer when moving it from cell to cell. This will help prevent splashing or throwing the electrolyte.

The hydrometer is mounted in a holder with drip cup; the thermometer is located in the pilot cell.

### 4.4 Changing the Solution

NAK and SAK type counter cells require periodically changing the solution. Refer to GTE Telephone Operations Practice series 205-010-XXX before inspecting this type cell or replacing the solution. Use extreme caution in mixing and handling this acid solution.

## 4. Battery Safety Precautions, continued

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### 4.5 Personal Protective Equipment

To ensure the safe handling of batteries and the protection of employees, the following equipment is required in all central offices, battery locations, PABX locations, and Remote Switching Unit (RSU) battery locations:

- Chemical burn neutralizer (Item ID 589621) – three bottles minimum.
- Bicarbonate of soda (purchase locally).
- Chemical indirect-ventilated goggles (Item ID 589367).
- Acid-resistant gloves (Item ID 582188 or Item ID 589622) and optional electrical rubber insulating gloves (Item ID 574070) which have had a dielectric test within the past nine months.

**NOTE: The due date for the next test must be marked on the gloves. They must be stored:**

- In a glove bag.
- With fingers pointing upward.
- A protective acid apron (Item ID 570167, Item ID 589620, or equivalent).
- Safety goggles (Item ID 589367 or equivalent).

**CAUTION: Always wear the goggles, gloves, and apron described above when working with battery electrolyte solution.**

Place all items referenced above on the battery maintenance safety board to allow quick access.

### 4.6 Emergency Spill Kit

When installing or removing batteries, maintain an Emergency Spill Kit (Item ID 881725 or equivalent) on site as a precautionary measure.

### 4.7 Battery Maintenance Safety Board

Keep an approved Battery Maintenance Safety Board (Item ID 580345 or an equivalent) at every battery maintenance location. (Refer to GTE Telephone Operations Practice 205-005-100.) These boards allow easy access and convenient storage of:

- Chemical burn neutralizer (three bottles).
- Personal protective equipment.
- Maintenance records (refer to GTE Telephone Operations Practice 205-005-100).

### 4.8 Chemical Burn Stations

Chemical Burn Stations are available for emergency first aid (refer to GTE Telephone Operations Practice 205-005-101).

At all battery charging locations and areas where cells or electrolyte are handled:

- Keep on hand a minimum of three bottles of chemical burn neutralizer.
- AND
- Locate them in an immediately accessible area.

## 4. Battery Safety Precautions, continued

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### 4.9 First Aid for Battery Acid Splashes

Battery acid (electrolyte) is corrosive and can destroy tissue. Do **not**:

- Splash or spill electrolyte in the eyes.
- Splash or spill electrolyte on the skin or clothing.
- Take electrolyte internally.

**CAUTION:** Obtain medical treatment as necessary for skin contact. In the event of eye contact, flush eyes and obtain immediate medical attention.

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If Electrolyte Is...	Then...
Splashed in the eyes	<ol style="list-style-type: none"><li>1. Start first aid immediately.</li><li>2. Use all available bottles of chemical burn neutralizer to flush the eyes; i.e., pour the neutralizer very slowly over the surfaces of the eyes and lids.</li><li>3. If neutralizer is not available, flush the eyes with large amounts of tap water for fifteen minutes. <b>Important:</b> Hold the eyelids apart to make sure the water or neutralizer washes all surfaces of the eyes and lids.</li><li>4. If the eyes are still painful, flush until comfortable.</li><li>5. Seek treatment by a physician <b>immediately</b> after flushing the eyes.</li></ol>
Splashed on the skin	<ol style="list-style-type: none"><li>1. Start first aid immediately.</li><li>2. Flush the skin with running water for at least fifteen minutes.</li><li>3. Seek treatment by a physician as necessary.</li></ol>
Splashed on clothing or shoes	<ol style="list-style-type: none"><li>1. Remove and isolate the contaminated items.</li><li>2. Move victim to fresh air.</li></ol>

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## 5. Cable Vaults

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### 5.1 Precautions

Examine these safeguards in cable vaults and ensure that:

- The access opening has a counter-balanced door that swings away from the wall.
- The opening can be guarded against persons falling into the opening when the door is open.

**NOTE: The guard may be a chain from the door to an eye hook on the wall.**

- The access ladder:
  - Has hand holds above the opening.
  - Is 16 inches wide with 1-inch rungs spaced 12 inches apart.
  - Is at least 7 inches from the wall.
- Each cable vault light is protected against being struck.
- The light switch for vaults reached by a ladder is outside the cable vault. The switch has a pilot light to indicate the cable vault lights are on.
- Cable ducts are plugged if not being used.
- Ducts with cable are adequately sealed.
- The cable vault has a mechanical vent or gravity vent to the outside of the building. (Refer to GTE Telephone Operations Practice 740-100-073.)
- A sump pump is provided to pump water from the vault.

## 6. Building Electrical System

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### 6.1

#### Precautions

Observe these safeguards with the building AC electrical system.

- The 120-volt AC receptacles must be the three-conductor grounded type.
- Use a receptacle tester (purchase locally) to determine if AC receptacles are wired with correct polarity and grounded.
- Identify what is served by all disconnecting methods such as circuit breakers and safety switches.
- Identify the breaker and breaker box served by each switchroom outlet and baylight.
- Guard against personal contact with all energized power conductors over 56 V DC.
- Ground all non-current-carrying metal parts of electrical equipment.
- Ground all dispensing or vending machines having metal cases. Ensure that they have no sharp edges.
- Refer to GTE Telephone Operations Practice 009-026-300 for lockout/tagout procedures.

### 6.2

#### Appliance and Extension Cords

**CAUTION: Extension cords are permitted only for temporary use.**

Ensure that all appliance and extension cords:

- Meet Underwriters Laboratories (UL) and National Electric Code safety standards.
- Are made of heavy-duty industrial grade material.
- Do not have splices.

**NOTE: Splices in appliance and extension cords are prohibited by the National Electrical Code.**

All new attachment plugs for appliance and extension cords must be the dead-front type.

## 7. Power Equipment

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### 7.1 Hazardous Voltage Levels

Central offices contain hazardous current voltage levels. Treat them with respect even if reasonable care has been taken to insulate and guard against them.

**CAUTION: Serious burns can occur if voltage is contacted. Wristwatches will become magnetized if worn.**

Prior to entering the equipment areas, persons involved in installation activity must remove metal objects or jewelry (e.g., rings, watches, bracelets, large belt buckles) that may come in contact with electrical components or become entangled with the hardware normally used in installation activity. Other Switching Facility personnel must remove such items prior to working in and around switchroom equipment. When working on or around "hot" equipment, do **not** wear wire rim (metal frame) corrective lenses without wearing safety goggles over them.

### 7.2 Danger of Metal Tools

When working around power boards or fuse panels, do **not** use any metal:

- Rulers.
- Uninsulated tools.
- Tapes.
- Lamp guards.
- Strand ropes.
- Ladders.

Do **not** carry metal pencils or tools projecting from your clothing.

**CAUTION: Use insulated tools when working on live power boards or other power equipment. Cover as much of the exposed metal as possible. See Section 10.3.**

Keep hands free of unnecessary tools or materials when operating switches or replacing fuses.

**NOTE: Refer to Section 10 of this practice for additional information.**

### 7.3 Working on Live Power Boards

When working inside the enclosure of a live power board, ensure that another person is stationed outside the enclosure to provide and recover tools and materials.

Only properly trained employees, under supervision, may clean and perform other work functions around power boards.

When cleaning power boards:

- Use approved insulated rubber gloves with a current dielectric test date.
- Stand on a dielectrically-tested rubber mat if contact with the commercial AC power supply is possible.
- Wear eye protection, and face away from switching during switch disconnect or reconnect.

Before opening the circuit with a knife switch, reduce the load or de-energize the equipment on any power circuit having a high amperage.

Use every possible means, including lockout and tagout procedures (see GTE Telephone Operations Practice 009-026-300), to remove the power from the equipment to be worked on.

**WARNING: Wear approved dielectric rubber gloves when working on high voltage systems that cannot be interrupted.**

## 7. Power Equipment, continued

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### 7.4 Ensuring the Power is Off

Do **not** take another person's word that the power has been turned off. Instead, proceed according to the instructions in the following chart.

---

Step	Ensuring the Power is Off
1	Check the switch. Place your lock on it if a locking attachment is provided.
2	Verify it with a voltmeter.
3	Place a "DANGER – DO NOT OPERATE" tag (Item ID 680921) on the switch.

---

**NOTE: See GTE Telephone Operations Practice 009-026-300 for lockout/tagout procedures.**

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### 7.5 Rotating Machinery

Only properly trained personnel may work on:

- Motor generators.
- Interrupters.
- Other rotating machinery.

When working on motors or generators:

1. Do **not** open the power switch until the equipment has been transferred to another supply source.
2. Place the appropriate "DANGER – DO NOT OPERATE" tag (Item ID 680921) on the switch, and remove fuses (if used).
3. When a locking attachment is provided, lock out the power by placing a lock on the switch. See GTE Telephone Operations Practice 009-026-300.

**CAUTION: Do not permit unauthorized persons inside machine enclosures.**

Work on machines in operation only when absolutely necessary, and follow these guidelines.

- Keep clear of the moving parts.
- Do **not** wear neckties or loose-fitting clothes.
- Ensure the light is adequate.
- Use approved extension lamps if necessary.

**CAUTION: Ensure that the cords do not come in contact with any moving parts.**

Before starting or operating any machine, be sure that the machinery is not defective. Ensure that:

- All gears, belts, and wheels are properly protected.
- Machine guards, tools, etc., are in safe positions.
- Belts are not worn or frayed.

**NOTE: Defective equipment must be tagged and reported for repairs.**

## 7. Power Equipment, continued

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### 7.6 Power Supplies

Only authorized personnel may perform maintenance or make adjustments on power supplies.

Do **not** work on chargers or power supplies while they are in operation except as permitted in the manufacturer's instructions or GTE practices.

### 7.7 Rectifiers/ Chargers

Only authorized personnel may perform maintenance or make adjustments on the rectifiers/chargers.

Ensure proper ventilation exists.

Occasionally, selenium stack rectifiers can develop internal defects causing them to arc and burn, which produces a toxic discharge with an extremely strong and pungent odor. If this occurs, immediately shut down the rectifier and thoroughly ventilate the area.

**CAUTION: Prolonged breathing of this discharge in any confined area can produce critical effects.**

**If an employee becomes sick after inhaling burning selenium fumes, special treatment is required. Call a physician immediately, and advise him or her of the exact nature of the poisoning.**

### 7.8 Bus Bars, Fuse and Switch Terminals

When working on bus bars (refer to GTE Telephone Operations Practice 205-705-201) and fuse or switch terminals of power boards or fuse panels (refer to GTE Telephone Operations Practices 026-100-500 and 205-000-500), observe these precautions:

- Do **not** use any uninsulated tools.
- Ensure that correct spare fuses are readily available when any work is undertaken involving power circuits which may result in blown fuses. If a ladder or keys are necessary to get to the fuse box, these also must be easily available.

The telephone company representative must ensure that the installation personnel fully understand any special provision or requirement such as:

- Fuse-bypassing switches.
- Alarm fuses associated with cartridge fuses.
- Use a fuse puller for removing or replacing cartridge or knife-type fuses.
- Do **not** substitute a higher capacity fuse in place of a lower capacity fuse.
- Do **not** guess what capacity fuse is required.

**NOTE: Always find the proper fuse specifications by referring to stenciling and equipment drawings.**

## 7. Power Equipment, continued

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### 7.8 Bus Bars, Fuse and Switch Terminals, continued

Observe the following precautions when working on bus bars:

- Ensure proper supervision of any work that is performed on a live bus bar or equipment.
- When working near or above a live bus bar, cover the bus bar with a suitable insulating material (e.g., rubber mats) to prevent shorting.
- Do **not** use a grounded electric drill when working on live bus bars. Use a drill with an approved system of double insulation.

**NOTE: Use electric drills marked “double-insulated” or battery-powered drills. Wear dielectrically-tested insulated rubber gloves.**

- Wear safety goggles when drilling bus bars.
- Remove all burrs and sharp edges from bus bars after drilling or cutting.
- When connecting a bus bar to any point, use a voltmeter to determine whether a voltage exists between that point and the bar to be connected.

**CAUTION: Do not make a connection until you are certain that no personnel or service hazard is involved.**

### 7.9 Transformer Vaults

Keep transformer vaults containing live parts locked at all times and marked with a conspicuous warning sign forbidding unqualified persons from entering.

Allow entry only to qualified persons who are properly authorized and accompanied by another employee.

**WARNING: Never enter a transformer vault alone.**

If the local power company is responsible for maintaining the transformer vaults, do **not** enter them unless accompanied by an employee of the power company.

**NOTE: Power cable openings entering the transformer vaults below grade must be sealed.**

## 7. Power Equipment, continued

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### 7.10 Emergency Generators

Before starting, operating, maintaining, or stopping an emergency generator, observe these precautions:

- All employees working on emergency generators must be trained in the correct and safe sequence of operations.
- Make sure that:
  - A “Danger – This Unit Starts Automatically” sign is posted on the generator.
  - A “Danger – Ear Protection Required Beyond This Point” sign is posted on the entrance door.
  - A “Danger – Ear Protection Required When This Equipment is Operating” sign is posted inside the generator room or module.
  - Ear protectors/muffs are provided. The ear protectors/muffs must be clean and stored in a dust-free container in a conspicuous location.
  - A fuse link operated shut-off valve is located inside the room or module in the fuel supply line between the day tank and engine.
  - The engine exhaust is piped to the outside of the building or module.
  - Belts are inspected periodically for excess wear. Replace as required.
  - Fans, belts, and gears are properly guarded from access by guards with openings no greater than one-half inch.
- Do **not** allow open flames in generator rooms.

**WARNING: Do not work on the generator engine while it is operating.**

Before working on the generator engine:

1. Place the starting control in the MANUAL setting.
2. Place a “DANGER – DO NOT OPERATE” tag on the switch.
3. Lock out the power by placing a lock on the switch when a locking attachment is provided. (See GTE Telephone Operations Practice 009-026-300.)

**CAUTION: Avoid contact with the exhaust manifold or exhaust stack when it is hot.**

### 7.11 Emergency Generators (Portable)

Before handling, storing, or transporting portable “handheld” generators and associated fuel, observe the following guidelines and procedures:

- The weight of handheld generators varies depending on size and manufacturer. For safety reasons, an individual should never lift more than can be safely handled by one person. When lifting a generator:
  - Consider your build and overall physical condition.
  - Exercise good judgment.
- A gasoline-powered carrier/mover (Item ID 326054, Honda P/N HP400) can be used to position a generator closer to the equipment requiring auxiliary power after the generator is removed from the vehicle. The carrier enables one person to manipulate a handheld generator over uneven terrain without lifting or straining.

## 7. Power Equipment, continued

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### 7.11 Emergency Generators (Portable), continued

#### 7.11.1 Fuel Transfer

Before a handheld generator can be stored or transported inside a vehicle, ensure that the fuel tank of the generator engine is empty. Follow these steps to transfer fuel.

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Step	Transferring Fuel
1	Allow the engine to cool sufficiently (approximately three minutes) after generator shutdown. (This ensures avoidance of fire in the event that fuel is spilled on hot engine components.)
2	Use a hand siphon or approved manual pump (Item ID 334107) to move fuel from the fuel tank to an approved container. Do <b>not</b> discard fuel on the ground.  <b>WARNING: Never use the mouth to start a tube siphon.</b>

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**NOTE: Refer to GTE Telephone Operations Practice 742-100-100 for information on combustible liquids.**

#### 7.11.2 Storage

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Portable Generators Can Be Stored in...	If...
Buildings and sheds	<ul style="list-style-type: none"><li>• All fuel has been drained from the engine's fuel tank.</li></ul> AND <ul style="list-style-type: none"><li>• The engine has been restarted and run until it stops. (This complete empties fuel lines and any residual fuel.)</li></ul>
Central office buildings	Placed in rooms which: <ul style="list-style-type: none"><li>• House permanently mounted generators.</li></ul> OR <ul style="list-style-type: none"><li>• Are designated exclusively for the storage of portable generators or other internal combustion engine equipment.</li></ul>

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Store fuel in:

- UL- or FM-approved flammable liquid containers (for example, Item ID 571591, 2-gallon; Item ID 571599, 5-gallon).

AND

- An approved area only.

**WARNING: Never store fuel in a central office building.**

Store empty fuel containers in any convenient storage shed outside the central office.

## 7. Power Equipment, continued

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### 7.11

#### **Emergency Generators (Portable), continued**

#### **7.11.3 Transport**

Transport portable generators in an enclosed vehicle after ensuring that:

- The fuel tank is empty. (This does not apply if transport is in the bed of a pickup truck or open trailer.)
- The vehicle is equipped with an approved, five-pound (or larger) dry chemical fire extinguisher.
- Appropriate equipment/manpower is available for loading and unloading the generator.
- Fuel required for the generator is transported in an approved container (for example, Item ID 571591, 2-gallon; Item ID 571599, 5-gallon).

### 7.12

#### **Grounding System**

Ensure that the grounding system is inspected and evaluated periodically to verify it is within established parameters and the test results are posted in compliance with GTE Telephone Operations Practices:

- 795-805-071, Central Office Grounding Systems Engineering Applications.
- 795-805-072, AC Service Grounding Engineering Applications.
- 795-805-073, Central Office Grounding Transmission Equipment.
- 795-805-074, Inspecting Electronic Central Office and PABX Grounding and Protection.
- 795-805-075, Remote Electric Serving Area Grounding System Engineering Considerations.

## 8. Ladders and Scaffolds

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### 8.1 Rules and General Precautions

When using ladders, observe these rules and precautions:

- Ensure the ladder is in good condition. Periodically inspect all ladders to ensure their safety.
- Use only an approved ladder designed for the specific work to be done.
- Face the ladder and use the handrail when going up or down.
- Keep three points of contact on the ladder at all times; i.e.:
  - One foot and two hands.
  - Two feet and one hand.
- Permit only one person on a ladder at a time.
- Stay out from under any ladder on which someone is working.
- Before moving a ladder, be sure there are no tools or other objects on or beneath the ladder.
- Equip all rolling ladders with “LOOK BEFORE MOVING” signs (Item ID 587225).
- Ensure that all ladders have safety tread (grooved steps or abrasive surfaces).
- **Never** move a ladder while standing on it. Instead, get off and move it.
- **Never** place a ladder against any movable object or insecure support.
- **Never** leave tools or test equipment unattended on a ladder unless they are securely fastened.
- **Never** step from one ladder to another without first coming to ground or surface level.
- **Never** climb higher than the:
  - Third rung from the top of straight and extension ladders.
  - Second step from the top of stepladder.
- **Never** place a ladder in front of a door unless the door is blocked or otherwise guarded.
- **Never** step on a “rung” ladder (re: extension, CEVs) unless you are wearing shoes with minimum ½-inch heels.

## 8. Ladders and Scaffolds, continued

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### 8.2 Track Type Rolling Ladder – Precautions

When using a track type rolling ladder, observe these precautions:

- Ensure that the rolling ladder brakes:
  - Operate properly; i.e., brakes lock when standing on third step or higher.
  - Prevent the ladder from rolling freely whenever someone is standing on the third step or higher.
- On distribution frame ladders, ensure that the rolling ladder handrail is on the far side (away from terminal blocks/protectors).
- On equipment line-up ladders, make sure that the rolling ladder handrail is on the left side facing the slope.
- **Never** twist the ladder while someone is on it.
- If the ladder is not equipped with brakes, block the wheels when working from the ladder.
- Do **not** allow the wire-reinforced brake release rope to protrude from the clamp (older method).
- Use care when descending from the first step to the floor. Look down before stepping off the ladder. Avoid a twisting motion.
- Use only approved ladder seats (Item ID 587028).
- Ensure that the ladder seat is securely attached to ladder step when in use. Use care when getting on or off a ladder seat so as not to dislodge it.
- Never stand on a ladder seat.
- Remove the ladder seat and store it in the designated area when it is not being used.
- Place ladder seats in a central location where they do not create a safety hazard.
- Do **not** leave equipment unattended on the ladder.
- Ensure that the electrical trolley is equipped with pusharms or chains to relieve strain on the electrical connection.
- Make sure that rolling ladder tracks are:
  - Properly secured by creep bolts at each end to the channel iron.
  - Equipped with stops at each end.
- Ensure that rolling ladders are equipped with “Before Moving – Look” signs (Item ID 587225).
- Ensure that all ladders have safety tread (grooved steps or abrasive surface).

### 8.3 Track Type Rolling Ladder – Maintenance

For more details on track type rolling ladder maintenance, see GTE Telephone Operations Practices:

- 237-200-202, Rolling Ladder Track and Rolling Ladders – Installation.
- 237-200-203, Rolling Ladders Equipped With W. E. Co. Type Brakes Adjustment.
- 237-200-204, Ladder, Rolling – Lubrication and Inspection.

## 8. Ladders and Scaffolds, continued

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### 8.4 Platform and “A” Ladders

**Always** observe these precautions when using platform and “A” ladders:

- Be sure the ladder is fully opened and the spreaders are locked.
- Secure the ladder to keep it from tipping over when you are working or applying pressure against a wall or piece of equipment.

Periodically examine the equipment to ensure that:

- Step stools have good treads and a friction base.
- Stepladders are equipped with safety shoes.

**NOTE: Only stepladders originally purchased with safety shoes are required to have them.**

### 8.5 Scaffolds

**Always** observe these precautions when using scaffolds:

- When erecting scaffolds, use extreme caution in handling the tubular metal supports.
- Tighten all the rigid and swivel joints securely to avoid slippage.
- Provide guard rails above working platforms.

**NOTE: If guardrails are not provided, employees working on the scaffold must wear a safety belt with lanyard attached to a substantial structure.**

- To keep the scaffold from tipping, tie it to the superstructure or bays with the straps provided.
- Provide locking devices for the wheels of all rolling scaffolds.
- Lock the wheels to keep the scaffolds from rolling.
- Secure the platform planks to the scaffold to prevent their slipping.
- When climbing to the platform, take slow, deliberate steps. Keep your balance. Throwing your weight to one end may cause the scaffold to tip.
- Block or secure wooden planks to prevent lateral movement.

When persons are required to work under scaffolds:

- Provide toe boards to prevent tools from falling.
- Require wearing safety hats.

Do **not** move rolling scaffolds with people on them unless the following conditions are met:

- The floor or surface must be within 3° of level and free from pits, holes, or obstructions.
- The measurement of the scaffold’s base must be at least half of the measurement of the scaffold’s height.
- The wheels must be equipped with rubber or similarly resilient tires.
- All tools and materials must be secured or removed from the platform.

## 9. Solvents, Lubricants, and Cleaners

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### 9.1 Precautions

Keep a Material Safety Data Sheet (MSDS) in the central office for each solvent, lubricant, and cleaner. (Refer to GTE Telephone Operations Practice 117-200-002.)

Train employees in the safety and health hazards for each solvent, lubricant, and cleaner. (Refer to GTE Telephone Operations Practice 117-200-002.)

Post a list of all approved solvents, lubricants, and cleaners in the central office. (Refer to GTE Telephone Operations Practice 220-101-104.)

**CAUTION: Use solvents (e.g., I.I.I. Trichloroethane, Freon TF, petrolatum, mineral spirits) only in well-ventilated areas.**

When working with flammable liquids or solvents, **always** observe these precautions:

- Avoid contact with the skin.
- Wear indirect-ventilated safety goggles (Item ID 589367).
- Wear gloves which the solvent cannot damage, dissolve, or penetrate. (Refer to GTE Telephone Operations Practice 075-190-105.)

Keep cleaning lubricants:

- Away from heat, fire, or sparks.
- In properly labeled metal shipping containers or safety cans.

**NOTE: Place the shipping containers and/or safety cans in a metal cabinet.**

Place warning labels on the new containers when solvents, lubricants, or cleaners are transferred out of the original labeled shipping containers. The label must indicate:

- The composition of the chemical.
- Safe practices required for using it.

**NOTE: Transferring chemicals to other containers is discouraged.**

**CAUTION: Do not use flammable liquids in a CO or PABX unless there is no alternative. If you must use a flammable liquid, dispense it from an approved safety can or dispenser.**

## 10. Tools

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### 10.1 Selecting Proper Tools

Use tools only for the purpose for which they were designed and select the proper tool for the job at hand. Use only tools which are GTE Standard.

Guidelines for using electrical tools and test equipment are covered in GTE Telephone Operations Practice 200-001-010.

All tools used on working equipment must be insulated. If tools are not insulated, the preferred method is to use heat shrink tubing as described in Section 10.3.

## 10. Tools, continued

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### 10.2 Hand Tools

Take extreme caution when using cutting tools such as knives, saws, or chisels.

When stripping sheathing from switchboard cable, use only approved tools. The hand holding the cable must be behind or above the stripping tool.

When using hand tools, observe these precautions:

- Carry hand tools in an approved tool pouch.
- When working with a screwdriver, hold it so that no injury will result to people or property if it slips.
- Do **not** allow the knurled teeth of pliers to become clogged with solder. Replace the pliers if the teeth are worn smooth.
- Do **not** permit anyone to use a nail puller or other special use tool without proper instruction.
- Do **not** use any tool not in proper working condition.
- Use appropriate eye protection.
- When storing a torque wrench, set it to "0" torque. If the setting is left on something higher, the calibration may be affected.

### 10.3 Tools Insulation

Tools and wrenches must be properly insulated while being used on or around live power/working equipment. This includes battery work, as well as power boards, chargers, bus bars, etc.

For power and bus bar insulation, cover all exposed positive potential surfaces (iron work, rack, frame, positive bus bar, etc.) surrounding the power connection to be worked on. Use rubber blankets; place them so that accidental contact will not create a short circuit.

The following insulation materials may be required:

- Heat Shrink, 1½", Item ID 883116 (double thickness for wrenches).
- End Cap (small), Item ID 747991.
- End Cap (medium), Item ID 747992.
- End Cap (X-large), Item ID 747993.
- End Cap (310–250 Item ID), Item ID 769824.
- Rubber Blanket, 27", Item ID 571031 (for iron work, etc.).
- Rubber Blanket, 36", Item ID 571030 (for iron work, etc.).

Follow these guidelines to reduce the possibility of causing a short when working on live power:

- Always use the smallest size standard torque wrench available for the job.
  - Most connections in the central office can be torqued with a ⅜" drive torque wrench.
  - Typical torque wrenches are:
    - Proto P/N 6008A, Item ID 589510, ½" dr – F-LBS (0–80 F-LBS)
    - Klein P/N 57005, Item ID 579347, ⅜" dr – I-LBS (0–150 I-LBS)
- Cover all metal parts of the torque wrench with heat shrink. (Electrical tape is not durable enough.)
- In emergencies, and when heat shrink materials are not readily available, a minimum of three electrical tape wraps with a half-lap overwrap is acceptable as a temporary measure.

## 10. Tools, continued

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### 10.3 Tools Insulation, continued

Use the following procedure for insulating a torque wrench, such as the two listed previously in this section, for use on batteries, bus bars, power boards, etc.

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Step	Insulating a Torque Wrench
3	<p>Set the torque wrench to the correct torque setting per:</p> <ul style="list-style-type: none"><li>● GTE Telephone Operations Practices:<ul style="list-style-type: none"><li>- 205-000-500.</li><li>- 205-001-500.</li><li>- 205-705-201.</li></ul></li></ul> <p>AND/OR</p> <ul style="list-style-type: none"><li>● Vendor manuals.</li></ul>
4	<p>Cut two pieces of 1½" heat shrink tubing (Item ID 883116) to a length about ¾ inches longer than the wrench. This allows an overhang of one inch on the drive end and over two inches on the handle end of the wrench.</p> <p><b>NOTE: Larger or smaller tubing may be used, depending on the size of the wrench; however, 1-1/2" is the correct size for the two wrenches listed above.</b></p>
5	<p>Slide one piece of heat shrink inside the other to form a double wall insulation.</p>
6	<p>Cut a hole through the double wall heat shrink tube about one inch from one end and large enough to allow a socket to protrude while attached to the drive. Slide the double-walled heat shrink tube over the torque wrench with the square drive extending through the previously cut hole, then install a socket. The socket will hold the heat shrink in place.</p>
7	<p>Some torque wrenches can be fitted with a permanent heat shrink end cap (such as Item ID 769824, when the Proto 6008A is used) over the handle end of the wrench to provide additional protection, provided this does not interfere with the torque adjustment. In addition, place the double wall insulation tube over the entire wrench as though the end cap was not there.</p> <p><b>NOTE: Always use end caps when it is possible.</b></p>
8	<p>Heat the heat shrink that extends beyond the handle end of the wrench, then "pinch" it to form a closed end.</p> <p><b>NOTE: Do not shrink the entire tube on a torque wrench; you will not be able to remove the tube to change the torque setting.</b></p> <p>It is important that the heat shrink extend far enough beyond the end of the handle (approximately two inches) to ensure that the handle will not protrude from the tube.</p>

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# 10. Tools, continued

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## 10.3 Tools Insulation, continued

**NOTE:** The heat shrink tube is usually not heated to make it a semi-permanent part of the tool because:

- In the case of the torque wrench, the setting could not be changed.
- In the case of the box wrench, the insulated end of the wrench would not be usable.

**You may shrink the heat shrink permanently on a plain ratchet, if it does not interfere with the reversing key.**

Heat shrink "tubing" can be reused numerous times; it is easily removed and installed by removing the socket and sliding the tube on/off the wrench.

Double insulate a box end wrench in the same manner as the torque wrench; however, the heat shrink must be held in place with cable ties. In this case, one end of the wrench must extend just beyond the end of the heat shrink; the other end is enclosed at the "pinched" end of the tube. The closed end of the handle is held between the "pinched" end of the heat shrink and the cable tie, which will hold the heat shrink in place.

## 10.4 Power Tools

Use care when handling or operating power tools. Observe these precautions when using power tools:

- Power tools must be:
  - Grounded with three conductor cords and plugs.
- OR
- Protected by an approved system of double insulation.

**NOTE:** Double-insulated tools must be distinctively marked "Double Insulated."

- Bits and blades for power tools must be sharp and in good condition.
- Wear approved eye protection spectacles with side protection shields (Item ID 577160 or equivalent) when operating any power tools or performing any drilling, wiring, or cutting operations. (Refer to GTE Telephone Operations Practice 075-676-100.)

**NOTE:** Refer to Section 7.8 for precautions to take when drilling live bus bars.

- Grip an electric drill firmly, but do **not** apply enough pressure to break the bit.
- Place loose material to be drilled in a vice. **Never** hold material in your hand for drilling.
- When drilling into the uprights of equipment bays, place a block of wood on the other side to prevent drilling into power cables.
- Use extreme caution when using a portable band saw, especially from a ladder. Check your footing and balance before operating the saw.
- Do **not** permit anyone to operate power tools without proper training.
- Do **not** remove or inactivate power tool guards.

Refer to GTE Telephone Operations Practice 200-001-010 for precautions that must be observed to avoid interference in electronic/digital offices when using electric tools and test equipment.

## 10. Tools, continued

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### 10.5 Soldering Irons

When using soldering irons, observe the following precautions:

- Wear eye protection while soldering. (Refer to GTE Telephone Operations Practice 075-676-100.)
- Inspect the electrical cords of soldering irons for defective insulation that could allow conductors to:
  - Contact equipment.
  - Cause shock or burns to employees.
- Replace defective plugs and cords.
- Keep soldering iron tips in working condition and properly tinned.

**NOTE: Damaged tips require excessive pressure to conduct heat and can slip, striking the user in the face or other areas.**

- **Always** place the soldering iron in a vise when changing or filing the tip.
- Connect the soldering iron cord to a receptacle in the equipment line-up in which you are working. If you must connect across an aisle, mark the cord with a flag, or place an object over it to prevent tripping on the cord.
- GTE safety procedures require using a fiber heat and safety shield between the soldering handle and the element. This shield protects the employee from severe burns that can occur if the iron is accidentally drawn through the hand.
- Place the hot soldering iron in a caged soldering iron holder when it is not in use.
- Do **not** flip solder from an iron or strike the soldering iron against a ladder to remove excess solder. Wipe it on the pad provided on the holder, or use a solder bag.
- Disconnect or remove power from soldering irons when the central office is left unattended.
- When working from a ladder, secure the soldering iron holder to the ladder and insert the iron beyond its collar to prevent it from slipping out and falling.
- Judge the temperature of soldering irons by applying solder to the tinned surface of the tip.

**CAUTION: Never hold the soldering iron tip near the hand or face to test its temperature. Serious burns may result.**

- Using a digital volt/ohm meter, read across the tip to ground on the AC scale. No voltage should be present. (Soldering iron must be plugged in.)

**NOTE: Refer to GTE Telephone Operations Practice 220-001-001 for related safety information.**

# 11. Installation

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## 11.1 General Safety Practices

**Always** observe the following precautions during installation operations:

- Clear excess material from floors around the frame area and sweep the floors at least daily.
- **Do not:**
  - Allow packing materials such as paper, foam, or any other trash to accumulate in the building. These materials must be removed daily.
  - Allow wire or wire clippings to accumulate on floors. Use wire bags.
  - Walk under construction crews working aloft.
  - Drop nuts, bolts, or other equipment to the floor from the tops of ladders and scaffolds.
- When passing material and tools to someone above you, be sure that the person above has a firm grip on them before you release them.

**WARNING: Never throw tools or materials to persons working above you.**

- Ensure removal of all floor anchors when frames are removed. If floor tiles are damaged, report it to the switchroom supervisor for Land & Building repair.
- Make all installation personnel aware of the need for using wire bags and drop cloths.
- **Do not** open windows in equipment rooms at any time unless absolutely essential for the entrance of equipment. Keep doors closed at all times when not actually in use.
- When drilling holes in floors, walls, or ceilings, or otherwise cutting through building structures, exercise care to prevent dirt and dust from getting into working equipment.

## 11.2 Primary and Secondary Superstructures

In an area where primary and secondary superstructure is being erected, observe these precautions:

- Wear safety hats. (This applies to all personnel.)
- Post “DANGER – SAFETY HAT AREA” signs to warn other persons as they approach.
- Use scaffolds whenever possible.
- Use the proper procedure when handling long lengths of framing bar and channel iron. (Refer to GTE Telephone Operations Practice 237-050-204.) Wear approved gloves.
- Place all heavy or long lengths of iron on wooden blocks to avoid injured fingers when placing iron on the floor. File off any sharp ends to prevent cuts.
- Be careful when placing framing bars in position.
- Threaded rods may have sharp or burred threads. Wear approved gloves while working with threaded rods. Use threaded rod caps or file cut or burred ends.

## 11.3 Grid Work

Be careful when walking on central office overhead grid. **Never** step on cables. Use plywood or other supportive material when installing multi-cable runs.

Beware of overhead protrusions and grip supports when walking on central office overhead grids. Safety hats are required.

# 11. Installation, continued

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## 11.4 Bays, Shelves, and Frames

When installing equipment on frames, bays, and shelves, observe these precautions:

- Use care when removing or replacing covers on relays, switches, frames, and other equipment to prevent grounding of the unit or damage to adjacent units.
- When covers for relays, switches, frames, and other equipment have been removed, place them in a safe location away from ladders and out of aisles and walkways.
- Install the equipment top angles before raising the vertical uprights so the uprights can be secured.

**WARNING: Never leave an upright unsecured at the top.**

- Hang shelves only with an approved shelf hoist.
- Be careful when placing the shelf hoist in position at a bay. Verify that all the sections are properly secured before using it.
- Before lifting the shelf, inspect it and make sure the shelf hook is in place.
- Maintain a safe, secure position when guiding equipment into place.

**NOTE: If safety ropes are required, assign one worker to each safety rope.**

- To avoid strain, use the shelf-handling guide to bring the shelf into the bay upright.
- Do **not** permit hoist cables to hang free when unattended. Secure the free ends to the bay or wind them up to the pulley.

## 11.5 Cabling/Wiring

Observe the following precautions:

- Use the proper lifting procedures when raising a loaded cable standard. Use the roller-type reel when possible.
- **Never** roll or store cable reels on floors that do not have adequate protection. Use fire-resistant fiberboard or similar for this purpose.
- When cable reels stored in the central office are not in use, cover them with approved flame-retardant, waterproof tarpaulins, and block the reels to prevent them from rolling.
- Locate the cable reel in a safe place to avoid blocking an aisle.
- Carry out cabling activities within the shortest interval possible, because of the dust dislocation caused by this operation.
- Do **not** allow cable sheathing, insulation, or wire clippings to fall on the floor where they may cause someone to slip and fall. Dispose of them in the frame bag or wire bag.

**NOTE: Sweep the floor frequently during cutting operations.**

- To avoid cutting the fingers, do **not** jerk the string tight when lacing cable. Use the proper size fingerless glove (Item IDs 582178 through 582190, Small through XXLarge).

# 11. Installation, continued

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## 11.5 Cabling/Wiring, continued

- **Always** wear eye protection when:
  - Cutting, fanning, or connecting cable, wire, or tie wraps.
  - Possibilities exist for injuries to eyes by wire protruding or flying from fanning or cutting operations.
- **NOTE: Refer to GTE Telephone Operations Practice 075-676-100 on eye protection.**
- Do **not** leave loose wire ends protruding into the aisle. Tie them back.
- Do **not** attach bare wires under screw-type connections. Always use spade connectors.
- When cutting ends or short pieces of wire, hold the wire end with one hand or with pliers to prevent it from flying.
- Heat-shrink, tape, or sleeve wires carrying potential or ground as soon as they are disconnected.
- When wiring on working equipment, ensure that all associated alarms are in working order.
- Use only standard wire-wrapping tools to make wire wrap terminations. Contact a switchroom supervisor when wrapping is necessary on live equipment.
- See Section 3.8 for cable hole treatment.

## 11.6 Crated Equipment

When moving crated equipment, **always** observe these precautions:

- Protect the floor from damage.
- Use a power hoist when possible to move equipment from one floor to another.
- **Never** try to move or lift heavy crates alone or by brute strength. Use leverages, dollies, etc.
- When lifting is necessary, follow these guidelines:
  - Keep the object close to you.
  - Bend your knees.
  - Lift with your legs, not with your back.
  - Ask for assistance on heavy objects.
- Place crates on blocks of wood to prevent injury to fingers and toes.
- Use a flat dolly when moving crated equipment to a bay. Do not move it alone. One worker must push and another pull to guide the equipment into place.
- When opening crates, keep the nails, box tops, etc., off the floor.
- After a crate has been emptied, remove it from the equipment room.
- Do **not** place crated or uncrated equipment where it will block:
  - Aisles.
  - Doorways.
  - Windows.
  - Power panels.
  - Fire extinguishers.
  - Exits.

## 11. Installation, continued

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### 11.7 Switchboards

When installing or removing switchboards, observe these precautions:

- Ensure that the keyboard brace is securely locked when raising a keyboard.
- Wear eye protection when replacing cord seats.
- Keep the wedges from slipping when raising the switchboard multiple. Moisten the slanted surfaces of the wedges with water before inserting them between the cables.

### 11.8 Removal of CO Equipment

When removing CO equipment, refer to safety precautions in the following GTE Telephone Operations practices.

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Refer to Practice...	For information on...
122-205-001	Battery removal and disposal.
122-205-003	Disposal of capacitors and light ballasts.
220-000-200	Equipment removal guidelines.

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## 12. Digital/Electronic Equipment

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### 12.1 General Considerations

Electrical shocks, electrocution, and radiation burns are always potential hazards to personnel working on electronic equipment which operates on or produces extremely high voltages or radiation. Such equipment includes:

- Mobile radio.
- Television.
- Microwave.
- Carrier.
- Fiber optics.

Because of the high voltages, stay alert and recognize the physical and electrical hazards when installing, testing, adjusting, or repairing this equipment.

Permit only experienced and trained personnel to work on electronic equipment.

Train inexperienced personnel under the direct supervision of an employee familiar with the potential safety hazards involved, for example:

- A competent supervisor.  
OR
- A training instructor.

## 12. Digital/Electronic Equipment, continued

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### 12.2 Precautions Applicable to All Work

Before starting any job, review the:

- Manufacturer's instructions.
- Applicable GTE Telephone Operations practices.
- "Cautions" and "Warnings" in all documents.

All personnel working on or in the vicinity of high-voltage equipment must be trained in:

- First aid procedures.
- Cardiopulmonary resuscitation (CPR) or artificial respiration.

Do not depend on safety interlock switches, although certain types of equipment (e.g., radio transmitters, doors, and/or access panels) may be designed with them. Always turn off the power and place your lock on the disconnect switch if a locking attachment is provided. Also place a "Danger - Do Not Operate" tag on the switch. (Refer to GTE Telephone Operations Practice 009-026-300.)

**CAUTION: Charged condensers may maintain high voltages in the equipment even after the power source has been cut off.**

When working on electronic/digital equipment, **always** observe the following precautions:

- Disconnect all primary voltages by:
  - Opening switches.OR
  - Removing the power cord from the power receptacle.

**NOTE: Use a voltmeter to be certain the equipment is de-energized.**

- Ground all high-voltage leads and discharge all high-voltage capacitors as described in Section 12.4.

**WARNING: Do not jumper out or wedge the interlock switches to energize the equipment unless practices call for such action. Use extreme caution.**

- Install warning or danger signs such as "DANGER - HIGH VOLTAGE" on all access doors or panels which permit exposure to high voltages.
- Before opening the main power switch for repairs or adjustments on high-voltage equipment, place a "DANGER - DO NOT OPERATE" tag on the switch handle. When a locking attachment is available, place a lock on the switch handle.

**NOTE: Place a lock on the switch whether or not the switch is visible to the person working on the equipment. See GTE Telephone Operations Practice 009-026-300.**

- Use extreme caution when handling any equipment containing static-sensitive devices. Refer to GTE Telephone Operations Practice 007-005-015.
- Do **not** wear metallic objects such as identification bracelets, rings, and wristwatches during installation activities. (Refer to Section 3.2.)

## 12. Digital/Electronic Equipment, continued

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### 12.3 Precautions When Working on Energized AC Equipment

Do **not** work on energized AC equipment unless it is essential to do so.

If you must work on energized AC equipment, **always** observe these precautions:

- Stand on an insulated mat (Item ID 571030,  $\frac{1}{8}$ "x36"x36"; or Item ID 571031,  $\frac{1}{8}$ "x27"x36").
- Wear insulated rubber gloves.
- Use extreme care to ensure that no part of the body touches the cabinet, electrical conductors, or other apparatus.

**WARNING: Do not reach around, over, or under energized parts.**

An electrical test instrument that has been isolated from ground (for a particular test) may be energized with hazardous voltage because of a short in the test set.

**WARNING: Do not come in contact with ungrounded test instruments at any time.**

### 12.4 Capacitors

To ensure that capacitors are not charged, take the following precautions each time power has been applied to the equipment.

1. Use a resistor circuit or 48 V test lamp for discharging all capacitors.
2. Use the same to touch other components in the circuit to discharge static or other latent voltage around the work area.
3. Use standard procedures to discharge high-voltage capacitors.

### 12.5 Radio Transmitter and Transmitter Rooms

**Important: Keep unattended transmitter rooms locked in accordance with FCC requirements and for safety purposes.**

Entrance doors must be clearly marked "DANGER – HIGH VOLTAGE."

Observe these precautions around radio transmitters and in transmitter rooms:

- Do **not** use or store flammable or explosive material in the same room with radio equipment. Fire and explosion can result from such action.
- If a cleaning solvent is required, use a material listed on the Authorized List. (Refer to GTE Telephone Operations Practice 220-101-104.)
- Locate the power switch near the transmitter and label it so that it can be instantly identified by a person who:
  - Is unfamiliar with the installation.
  - Needs to disconnect the power in an emergency.
- Cover the floor around the transmitter with rubber matting or linoleum.

## 12. Digital/Electronic Equipment, continued

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### 12.6 Radio Transmitter and Transmitter Rooms – Equipment and Tools

Use the following equipment and tools for adequate protection in transmitter rooms:

- Electrical rubber insulated gloves. (Refer to GTE Telephone Operations Practice 075-190-100.)
  - Insulated tuning tools to fit transmitter and receiver requirements.
  - A fuse extractor or standard fiber fuse puller for pulling and replacing fuses.
  - High voltage test leads, made with an insulated cover having high voltage breakdown characteristics in excess of the voltages to be measured. These test leads must:
    - Be appropriately marked and equipped to connect to meters.
- AND
- Have insulated alligator clips or an equivalent on one end.
  - A grounded insulated test probe, used to bleed off charged capacitors.

### 12.7 Transmitter, Receiver, and Carrier Equipment – Pole-Mounted

Keep the equipment mounting cabinets locked at all times to prevent unauthorized tampering and individuals from coming in contact with the high voltages found in such equipment.

**WARNING: A federal warning sign must be placed on cabinets. (Refer to GTE Telephone Operations Practice 000-100-200.)**

Provide a wooden platform with a guard rail on the pole in a manner for easy access to the equipment. Use a rubber blanket and electrical rubber insulated gloves for added protection when required.

Use GTE standard body belts and safety straps when climbing and working on poles. (See Section 12.9.)

### 12.8 Microwave Installations

Observe these precautions when working with microwave installations:

- Avoid exposure to microwave radiation. Besides the danger of high voltage, it will produce heat in the body tissues.
- Use eye protection. Direct radiation from the waveguide is harmful to the eyes.

**WARNING: Do not perform inspections at the end of the waveguide while the power is turned on.**

## 12. Digital/Electronic Equipment, continued

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### 12.9 Antenna

When working on or around towers supporting microwave or other antenna systems, follow safety procedures specified in GTE Telephone Operations Practice 117-200-004.

When climbing poles supporting microwave or other antenna systems, wear the following safety equipment:

- Gloves.
- Safety hat.
- Body belt.
- Safety strap.

Regardless of weather conditions, take extreme care when climbing on roofs or other structures.

**WARNING: Do not attempt to work on poles or towers during severe wind, lightning storms, or icing conditions.**

When required to disconnect the antenna from radio equipment, be certain all attached equipment is turned off and tagged. Follow safety procedures when connecting an interim ground to the antenna.

Before working on antenna and pole-mounted carrier equipment, determine what safety precautions will be necessary by carefully examining the antenna supports and poles. This examination must include:

- Electrical hazards such as burns or shock from:
  - Radio energy on this or a nearby antenna system.
  - Electrical wiring on the antenna support.
  - Nearby high voltage power lines.
- General precautions for antennas mounted on:
  - The ground.
  - A building.
  - Wood poles.
- Safe procedures for climbing wood poles.
  - Without guy wires or steps.
  - With guy wires.
  - With steps.
- Safe procedures for climbing metal towers, poles, or masts which are:
  - Solid type.
  - Lattice type.
  - With guys.
  - Without guys.

## 12. Digital/Electronic Equipment, continued

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### 12.10 Fiber Optic Transmission Systems

Fiber optic transmission systems use Class III B diode lasers as their source of optical power. Current systems and associated optical test sets use a 0.82 micron laser wavelength. The emitted light is officially classified as invisible; however, many people can see it as a red light.

When fiber optic transmission systems are operating under normal conditions, they present no hazard to safety or health. For this reason, these systems are classified as Class I laser systems and no special precautions are required.

The optical time domain reflectometer (OTDR) used in splicing and testing procedures also contains a single source Class III B diode laser.

**CAUTION: Light wave radiation from a Class III B diode laser can cause damage to the retina of the eye when viewed with an optical instrument such as a microscope, magnifying glass, etc.**

Under normal conditions where fiber optic transmission systems are completely enclosed, employees must **not** disconnect any fiber optic cable or system component.

Under servicing or maintenance conditions where the fiber optic transmission system is no longer considered as enclosed, **always observe the following precautions:**

- Permit only authorized trained persons to service and maintain fiber optic transmission systems.
- Do **not**:
  - Perform intrabeam viewing of active fiber or cable ends at distances less than six inches.
  - Use optical viewing devices such as magnifying glasses which increase image size greater than twenty times for intrabeam viewing of diode laser radiation.

**CAUTION: Using optical viewing devices for intrabeam viewing is unnecessary and is not recommended when a system is under power.**

### 12.11 Amplifiers

Audio, video, and similar amplifiers generate high voltages. These amplifiers usually have a protective shield around the high-voltage section.

The wiring is protected in various ways to prevent accidental contact with these dangerous voltages. If you must remove these covers, take the same safety precautions as those outlined in Sections 12.2 and 12.6.

The safety covers must **never** be off any longer than necessary to accomplish tests or repairs. Keep all unattended operating equipment covered.

### 12.12 Testing Equipment

Most radio and video test equipment employs high voltages for operation. This equipment requires the same precautions as those observed for transmitters and receivers.

# 13. Supplemental Reading

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**13.1  
Additional  
Material**

The following chart provides sources of supplementary information related to this practice.

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<b>For Information About...</b>	<b>See Practice...</b>
Equipment Rooms Housekeeping	200-001-004
Battery Room or Area Ventilation Engineering Application	742-205-070

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