

**PREVENTION OF SERVICE INTERRUPTIONS**  
**PERSONAL INJURIES**  
**DAMAGE TO BUILDING EQUIPMENT**  
**ATTACHMENT WECO HANDBOOK 22, SECTION 10**

**1. GENERAL**

- 1.01** This section face sheet is issued to assign its 9-digit number and title in place of the previous 9-digit number, 201-112-015, which was assigned to the section entitled "Prevention of Service Interruptions — Personal Injuries — Damage to Building Equipment — Attachment WECO Handbook 22, Section 10." The previous 9-digit assignment is canceled. Notice of cancellation and a cross reference to this section number will remain in the appropriate Division Index for a minimum of 12 months.
- 1.02** When this section is reissued, it will be issued in a standard format.
- 1.03** Recommendations for changes, additions, or deletions to this section should be forwarded as specified in Section 000-010-015.
- 1.04** The old section and any current addendum and attachments should be removed from their previous place in the file and attached behind this page and then filed by the new number.

**NOTICE**

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PREVENTION OF SERVICE INTERRUPTIONS - PERSONAL INJURIES -  
DAMAGE TO BUILDING EQUIPMENT

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1. WORK HAZARDS AND PROTECTION

1.1 Work operations involved in power transitions are subject to the same hazards as other installing operations. In addition, other hazards exist that are peculiar to power.

1.11 Most of the power transitions take place in locations where a single accident may disable thousands of subscriber lines or even an entire office. They expose the installer to greater danger from electric shock and burns than other operations in the telephone central office.

1.12 The movement of heavy equipment such as rotating machinery, batteries and power bays during transitions, should be carefully controlled to prevent damage to the building and its equipment.

1.13 For detailed information on the methods used for protecting equipment during power transitions, refer to Section 11 of this handbook.

2. PREVENTION OF SERVICE INTERRUPTIONS

2.1 Listed below are various types of hazards responsible in the past for service interruptions, with suggestions for their elimination or neutralization.

2.101 Lack of Experience Skill and Supervision

(a) Installers with the highest level of experience and skill available should be used on power transitions that involve working circuits.

(b) Constant supervision shall be furnished when operations are being performed that may cause a service interruption.

(c) A review of safety precautions and requirements should always be made by all personnel involved in a transition before work is started.

(d) Verify that supports will bear additional loads if any.

2.102 Carelessness

(a) Tools, conduit or other metallic objects should never be placed in a position where a slight movement may cause them to fall across and connect two different potentials or ground and one potential.

(b) Overhead wires and cables should be run carefully to prevent their falling into working equipment. Secure the ends temporarily if necessary.

(c) Verify all wire ends before connecting them to working circuits, do not depend on attached tags.

(d) Protection should be installed and secured in position before work is started.

2.103 Work On or Near Live Equipment

(a) When it is necessary to work on or near live equipment, the polarity and potential of current carrying parts should be carefully verified, using an ITE-4442 Volt-Ohmmeter.

(b) The work area should be completely isolated from other current carrying parts or grounded objects, by means of protection installed to conform with the methods described in Section 11.

(c) Tools used in the work area shall have the metallic parts protected with at least two layers of friction tape or equivalent insulation applied as far as practical.

(d) Added apparatus or equipment should be mounted and securely fastened before connections are made to working circuits.

2.104 Improper or Incomplete Identification

2.1041 Positively identify existing wires on the cable rack or other locations when they are to be cut or spliced to other wires. When electrical tests cannot give positive identification, trace the wire physically from its termination.

2.1042 Replace temporary identification marks with permanent stamping as soon as possible during the transition.

2.1043 (a) When removals include disconnecting conductors from a ground or battery supply after all loads have apparently been removed, use a clamp-on ammeter or other suitable test equipment to verify that no current is flowing through the conductor about to be removed. There may be a tap taken off to supply an undischarged circuit in service.

(b) When a connection of this type is opened an arc will indicate the presence of current, immediately reconnect and investigate the source of the load. Contact the equipment engineer for further instructions regarding the removal of the load.

2.1044 A joint check should be made of all existing stamping, by the installer and the Telephone Company representative, any discrepancies should be referred to the equipment engineer for correction.

2.1045 Stamp all new information as soon as changes are made and inform the telephone company immediately to avoid errors due to habitual operation.

#### 2.105 Current Supplies at Different Potentials and Grounded Equipment

2.1051 When work is to be done on a live circuit adjacent to a current supply at a different potential or grounded equipment, isolate the adjacent equipment as outlined in Paragraph 2.103.

2.1052 Live bus bars should never be drilled with an electric motor drill, use a wheel drill or hand brace.

2.1053 Verify that electric soldering coppers are ungrounded before using them to connect additional wires to live terminals. Refer to Section 19 of Handbook 28 for the proper method of verification.

#### 2.106 Loose and Fatigued Connections - Clearances

(a) A joint inspection of the circuit to be worked on by the Telephone Company representative and the installer will reduce service interruptions due to loose or fatigued connections. Also inspect for proper clearance between adjacent connections.

(b) Protect wires and forms from accidental impact that may break wires from their terminations. Fiberboard or other rigid protection may be used for this purpose.

#### 2.107 Deviations from Handbook Requirements or Transition Method of Procedure

(a) Handbook requirements shall be followed, they are the results of many years of experience.

(b) Tests shall be made in the sequence shown in the test methods.

(c) Work on power transitions shall proceed as outlined in the Transition Method of Procedure. The sequence of steps should not be changed unless agreement is reached with the telephone company.

#### 2.108 Errors Involving Released Equipment

(a) Released equipment may be blocked in a nonoperative position to prevent errors that may return the equipment to service prematurely.

(b) When a fuse is removed from a circuit that involves released equipment install a dummy fuse in its place to prevent another fuse from being installed. Also tie a Warning Tag ID-1270-A to the fuse position.

(c) An ID-1270 Warning Tag should be tied in place to warn against working on live circuits unless permission is granted by the supervisor.

(d) Electric test equipment should be used to verify that fuses have been removed or the circuit has been properly released before starting work on the transition.

#### 2.109 Uncleared Troubles in Added Circuits

(a) Temporary or other circuits to be added to equipment in service shall be free of all faults before they are connected to a circuit in service.

(b) Artificial loads used for testing power equipment should never be connected to common current supplies without including the proper fusing in the temporary circuit.

(c) Added circuits for supplying alternating current to equipment shall be "phased out." Use the method contained in Section 135 of Handbook 19.

#### 2.110 Opening Connections of Circuits In Service

2.1101 When it is necessary to open a connection temporarily, to add or remove a conductor, connect a backtap of sufficient capacity to bypass the point of connection prior to starting the modification. This will provide continuity and prevent a possible service interruption. Remove the backtap when all other work is completed.

#### 2.111 Reducing Battery Capacity For Transitions

2.1111 To prevent an entire central office battery from being lost to service due to a surge caused by accidental grounds or short circuits, the battery capacity should be reduced by disconnecting as many battery strings as possible, when the battery consists of two or more strings connected in parallel. This should be done prior to the start of any transition that might affect the battery and should be in agreement with the telephone company's representative. The reason for doing this is to make available for emergency use, at least one battery string, in case the string or strings in service are involved in an accident.

2.1112 Disconnect a string by removing the intercell connectors between adjacent cells, preferably in the center of the string. Reconnect when the transition is completed or when necessary due to service requirements.

### 3. PLANS FOR RESTORING SERVICE

3.1 Before attempting any operation that might result in a service interruption, plans should be made for restoring service promptly if an interruption should occur. The plans should cover approved procedures for making defective equipment busy, transferring to emergency, mate or spare equipment, replacing blown fuses in working circuits, etc.

#### 3.2 Replacing Blown Fuses

3.21 Determine the location, type and capacity of all fuses serving the equipment to be worked on and the adjacent equipment.

3.22 See that spare fuses of the required type and capacity are available and note their location. Make them more readily available if deemed necessary. See that appropriate tools for replacing the fuses are also available.

3.23 Verify the condition of any spare, fuses that may be used.

3.24 When fuses that may be blown are located out of reach, have a ladder continuously ready; when fuses are located in a locked power room, keep the key available; when they are in enclosed cabinets, guard rails, etc., keep appropriate tools handy.

3.25 When a main fuse blows in circuits having decentralized filters, the surge to charge the filter capacitors may cause the replacement fuse to blow too as if the original trouble had not been cleared. In offices having filters or other large capacitors on the discharge leads, discuss with the telephone company plans for restoring service if a fuse should blow. Plan to remove most of the subsidiary fuses before replacing the blown fuse. Then restore the subsidiary fuses after removing their subsidiary fuses, if deemed necessary. If this does not include removal of fuses for filter capacitors these will probably be blown. Replace filter capacitor fuses last after charging each capacitor through a lamp as described in several handbooks, for example, Handbook 19, Section 10 or Handbook 21, Section 199B.

3.26 Discuss the foregoing preparations with all affected personnel.

#### 4. PERSONAL INJURIES

4.1 General information on precautions to be taken to prevent personal injuries is contained in Handbook 0. Specific information required for installing operations may be found in Handbook 18. Other information required for transitions is included in this handbook.

##### 4.2 Electric Shock

NOTE: Under no circumstances shall the installer work on "live" circuits when the potential is above 255-volts. Power should be removed by the telephone company representative.

4.21 Electric shock caused by contact with live power equipment or circuits that supply current for use in a telephone central office may cause burns or other injuries depending on the amount of current flowing in the area of contact, the length of time involved and the body area affected by the shock. Ventricular fibrillation can occur at potentials lower than 150 volts.

4.211 To help minimize this type of hazard the following suggestions are made:

(a) Arrange to remove current from the circuit to be worked on and adjacent circuits when this can be done without interrupting service. Always test

the circuit for absence of potential after fuse removals or other releases from service are made.

4.212 When work must be done on live commercial power service at least two men should be assigned. They should both be familiar with the hazards involved and know what action to take if an accident occurs. Station one man at the location where power can be removed from the circuit immediately if required.

4.213 Insulate tools and provide sufficient protection to isolate all danger points. Secure all protection in place.

4.214 Place caution signs to indicate the location of potentials over 130 volts.

4.215 Remove jewelry or other metal objects to prevent accidental contact with live parts.

4.216 When floors are damp, stand on insulated mats while working on or near live equipment.

#### 4.3 Burns

4.31 Electrical burns usually are the result of touching live parts having higher potentials than 130 volts or they may be the result of an accidental short circuit, grounding a live conductor, overloading a circuit or other breakdown. Molten metal may be spattered on the skin or the eyes. Gloves should be worn and goggles or safety glasses used as required to guard against all types of burns.

4.32 Burns caused by soldering operations or lead burning are also hazards that exist in some types of transition work.

4.321 When heating a solder type lug to remove it from a wire end, grasp the lug tightly with gas pliers to prevent it from dropping off the wire suddenly as the solder melts. Apply the heat evenly to include the top and bottom of the lug. Dry canvas may be used to catch any hot solder that may spill.

4.322 Lead burning is particularly hazardous and only experienced lead burners should be used. The flame must be adjusted properly and held at just the right distance from the lead to prevent spattering. Goggles furnished with the burning kit must be worn and sleeves must be rolled down to protect the arms, gloves shall also be worn.

#### 4.4 Removed and Added Equipment

4.41 To prevent personal injury during removals or additions proceed as follows:

(a) Remove bolts and other fastening devices from floors and walls and arrange to patch the remaining holes immediately.

(b) Cutouts in floor coverings should also be replaced when exposed after removals.

(c) Place temporary covers over cable holes when left unattended during removals or additions. Place a caution sign in close proximity to the hole.

(d) Immediately remove any oil or grease that may be spilled while removing rotating machinery or other equipment containing oil or grease.

(e) Store removed equipment in a well lighted area, in an orderly manner, until ready for disposition.

(f) Before removing permanent lighting, arrange to replace it with temporary or new lighting when conditions require it.

(g) Removals and additions involving open tank batteries and CEMF cells, require special protection for handling electrolyte or alkaline solutions. Refer to Section 430 of this handbook and Handbook 18.

#### 4.5 Hydraulic Compression Tools

4.51 Oil leaks under high pressure may take the form of a very fine spray. When the spray is first noticed, turn off the equipment being used at once. Never permit the spray to make body contact, as it is possible for the spray to penetrate the skin. Clothing may also be ruined.

4.52 Compounds used for making compression connections have a deleterious effect on clothing. Use a wiping

cloth of cotton to remove the compound from the skin. Canvas used as an apron and tied around the waist will help prevent the compound from contact with clothes.

#### 5. DAMAGE TO BUILDING EQUIPMENT

5.1 The prevention of damage to building equipment is covered generally in Handbook 0. Other information necessary to protect building equipment during transitions is covered in the sections of this handbook when special care is necessary.

5.11 On transitions that include the removal of electrolyte from the building, arrange to place it in suitable containers such as carboys. Never dispose of these solutions through piping of the building drainage system, unless written permission is obtained from the telephone company.

5.111 Electrolyte spilled on the floor should be promptly neutralized as covered in Handbook 18 and Section 430 of this handbook.

5.12 Protect floors with floor matting or fiberboard before storing removed or new equipment during transitions.

5.13 Heavy equipment can be rolled to a new location by using short lengths of pipe or conduit, 1-1/2" in diameter or larger. Protect the floor covering with fiberboard or plywood.

5.14 Walls and similar surfaces should be protected with fiberboard during cable removals or other operations that may damage the surface.

→ Arrowed lines indicate new or changed information.

R. W. HILLEGAS

Superintendent, Installation Engineering

#### Reason for Reissue:

- (1) To add information on Electric Shock.
- (2) To remove section numbers from reference to Handbook 0.
- (3) To add mounting information.
- (4) To add hydraulic compression tools.
- (5) To change reference from Section 130 to 135 in Handbook 19.
- (6) To add note on potentials above 255 volts.

Replaces Section 10 dated 8-16-62.