Stromberg-Carlson DCO Switching System Grounding Engineering Applications

Contents

1. General

1.1 Purpose

This practice describes how the Stromberg-Carlson DCO switching system grounding must be connected into the GTE central office grounding- The Stromberg-Carlson practices must be used for grounding requirements within the DCO switching systems.

This practice clarifies the interfacing of the SC DCO switching system grounding with GTE Telephone Operations grounding within the Central Office.

1.2 Filing Instructions

File this practice in numerical order in your practices set.

1.3 Copyright and Responsibility

This practice was written by the Protection Engineering Support Department and published by the Telephone Operations Administrative Services Department. For more information about this practice contact the Network OSP Engineering Design Department.

1.4 Disclaimer

This practice has been prepared for GTE Telephone Operations employees, customers, and end users' employees who operate and maintain the equipment engineered and installed by GTE. The information in this practice is subject to change and may not be suitable in all situations. GTE Telephone Operations acknowledges that a customer's special requirements or practices may take precedence over those supplied in this practice if a conflict develops during installation or ongoing operation. GTE Telephone Operations hereby disclaims any responsibility or liability for any consequential or inconsequential damages that may result from the use of this practice.

1.5 References

Typically the grounding within the switching frame and related equipment area must follow Stromberg-Carlson practice 01-019-03 and related documents.

Outside this area, apply the GTE Practices in the following chart. Using these practices and documents ensures proper personnel safety and equipment protection according to manufacturer warranties. Misunderstandings by the manufacturer and by GTE Telephone Operations personnel can be avoided by using thii practice.

GTE Practice Number	Title	Covers
795-805-071	Central Office Grounding Systems Engineering Applications	Building grounding details. Also see Practice 795-805-072
795-805-072	AC Service Grounding Engineering Applications	Electrical service and distniion up to the branch panel serving the switching system.
795-805-073	Central Office Grounding Transmission Equipment	Transmission and other miscellaneous equipment grounding requirements.
795-805-074	Inspecting Central Office Grounding and Electrical Protection	Inspecting grounding up to the DCO systems for numbered leads in GTE Telephone Operations Practices 795-805-071, 795-805-075, and this practice.
795-805-075	Remote Electronic Serving Area Grounding Systems – Engineering Considerations	Building grounding details. Also see Practice 795-805-071.

1.6 Acronyms

The acronyms used in this practice are defined in the chart below:

Acronym	Definition
AWG	American Wire Gauge
DCD	Digital Central Office
ECPGB	Entrance Cable Protection Ground Bar (located on the MDF)
FGB	Floor Ground Bar
GVVB	Ground Window Bar
IGZ	Isolated Ground Zone
KCMIL	One Thousand Circular Mils
MDF	Main Distributing Frame
MGB	Master Ground Bar
OOSP	Outside Plant
SCPs	St romberg-Carlson Practices

2. Grounding Electrode

2.1 General

The central off ice electrode ground resistance to earth must comply with the objectives specified in GTE Telephone Operations Practices 795-805-071 and 795-805-075. These practice objectives over resistances lower than the 5 ohms recommended by Stromberg-Carlson.

3. Master Ground Bar/Floor Ground Bar

3.1 General

The central off ice grounding system must have a single master ground bar. Larger building structures may require extension of the basic building grounding system with:

- Floor ground bars.
- Vertical equalizers between floor levels.
- Horizontal equalizers between ground bars on the same floor level.

These requirements are fully detailed in and must comply with GTE Telephone Operations Practices 795-805-071 and 795-805-075. These practices specify the required use of two-hole copper lug connectors to terminate conductors on the MGB/FBs. These GTE Telephone Operations Practices must also be followed for physical placement of the ground bars and the leads that must be connected.

4. Entrance Cable Bonding

4.1 General

GTE Telephone Operations Practice 795-805-071 details the required methods used to bond metal shields of copper conductor and light waveguide cables entering the central off ice. This includes any cable vault ground bars and related leads. According to GTE standards, maintain electrical continuity across tip splices of copper conductor cables, even though Stromberg-Carlson practices recommend interruption. A two-inch air gap must be provided in the metallic members of light wave guide cables just after the bond made to the exterior portion of the fiber optic cable.

5. Entrance Cable Protection Ground Bar

5.1 General

Although Stromberg-Carlson recommends isolation of the MDF protector module grounds and the entrance cable protection ground bar (ECPGB) from the MDF framework, standard GTE integration of the protector module ground with the MDF framework must be provided for personnel safety. The MDF copper protection ground bar and protector modules must use leads 23, 24, and 24A according to GTE Telephone Operations Practices 795-805-071 and 795-805-075. The MDF lead 23 must be connected to the same specific floor level MGB/FGB that is also connected to the GWB.

6. AC Power

6.1 General

All AC power outside the Stromberg-Carlson DCO switching system must comply with the requirements of GTE Telephone Operations Practice 795-805-072.

GTE standards require that modems, announcers, etc., be engineered for DC power to avoid any AC power requirements in the DCO frames. Provide DC-to-AC inverters according to Stromberg-Carlson information without connection to the commercial AC service to power any AC equipment that you cannot avoid. GTE recommends redundant inverters whenever the inverters supply equipment considered critical to the operation of the DCO.

GTE Telephone Operations recommends upgrading existing DCO systems on the next equipment entry basis. Where equipment failures or damages can be attributed to AC power surges or lightning, handle the upgrade on an expedited basis.

7. DC Power System Grounding

7.1 General

The frameworks of the rectifiers, battery rack, main power panel, and subsequent power distribution bays are electrically isolated from the DC return power. These frameworks outside the DCO area are grounded by leads 31 through 36 as described in GTE Telephone Operations Practice 795-805-071. Leads 53A and 38A must be applied appropriately to remote power distribution outside the DCO equipment frames.

Only DCO equipment can be powered from a remote DCO DC power distributions bay. Apply GTE Telephone Operations Practice 795-805-071, “Using Separate PDUs."

7.2 Rectifiers

AC power to the rectifiers must have AC equipment grounding conductors to leads 29, 31, and 32 as described in GTE Telephone Operations Practices 795-805-071 and 795-805-072.

7.3
Lead 37

GTE standards require placement of the DC power plant reference lead 37 from the return terminal of the 50 volt DC battery to the MGB/FGB in the immediate floor level area. (See GTE Telephone Operations Practice 795-805-071.) This differs slightly from the SCPOs placement of an equivalent reference connection between the main DC power board return bus and the MGB/FGB. Lead 37 is sized as follows:

If the...	Then Lead 37 is...
DC power plant capacity exceeds 500 amperes	750 kcmil.
Structure is multiple floor, as defined in the "Terms" section of Acronyms and Terms in GTE Telephone Operations Practice 795-805-071	750 kcmil.
Length of lead 37 is greater than 50 feet	750 kcmil.
• Single-floor structure is larger than 350 kcmil. 9-by-11 feet • DC power plant does not exceed 500 amperes AND • Lead 37 does not exceed 50 feet	
Single-floor structure is a controlled environmental vault or a walk-in hut that does not exceed 9-by-11 feet	2/0 AWG.

8. Electronic Switching System Grounding

8.1
General

The Stromberg-Carlson practices dictate the grounding requirements within the DCO switching system.

8.2
DCO Ground Window Bar

The Stromberg-Carlson DCO switching system has a ground window bar (GWB) located adjacent to the DCO equipment area. The ground window bar must be electrically isolated from the building. Since the GTE standard is to use only Stromberg-Carlson standard DC-to-AC inverters if AC power is necessary, no commercial AC power conductors can be terminated to the GWB.

8.3 DCO

For the DCO switching system, the following is required:

If the...	Then...
• The DC power plant is placed on the same floor-level AND • Lead 37 bonds to the same MGB/FGB in this floor-level area with the DCO	Bond this MGB/FGB to the DCO ground window bar. lead 37 references the DC power to this same MGB/FGB. Refer to Exhibit 1 on page 9 and Exhibit 3 on page 11 for details.
• The DC power plant is located one floor-level away from the MGB/FGB where lead 37 bonds	Bond the FGB on the same floor level with the DCO to the DCO ground window bar. Refer **to** Exhibit 2 on page 10 and Exhibit 3 on page 11 for details.

Location of the Stromberg-Carlson DCO switching system more than one floor from the DC power plant is not recommended under GTE standards. Any requirement for more than one floor separation must be fully reviewed on a site specific basis by Protection Engineering Support during the planning phase to ensure that an alternate arrangement is possible to meet Stromberg-Carlson and GTE protection needs.

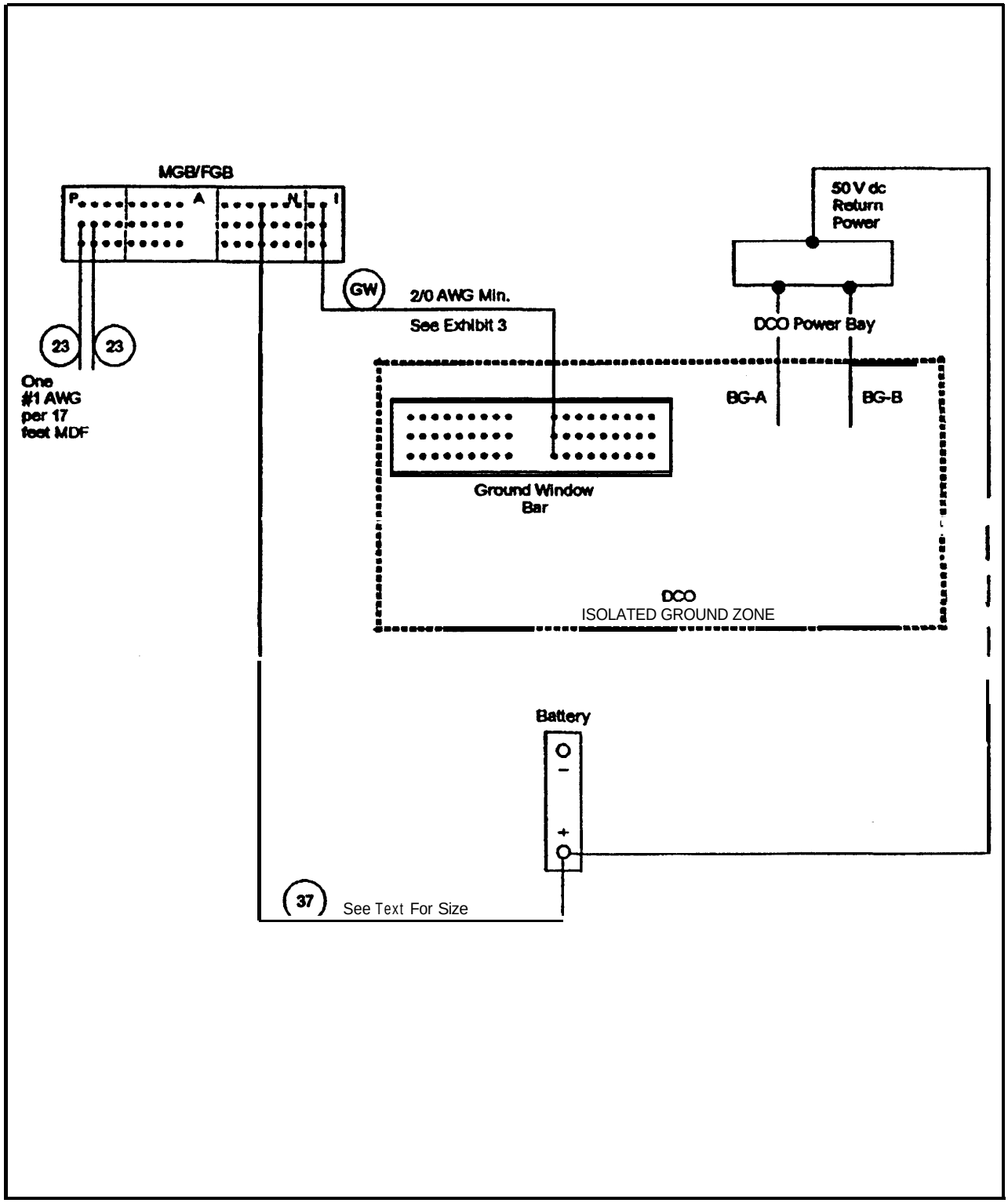

Exhibit 1– DC Power on the Same Floor

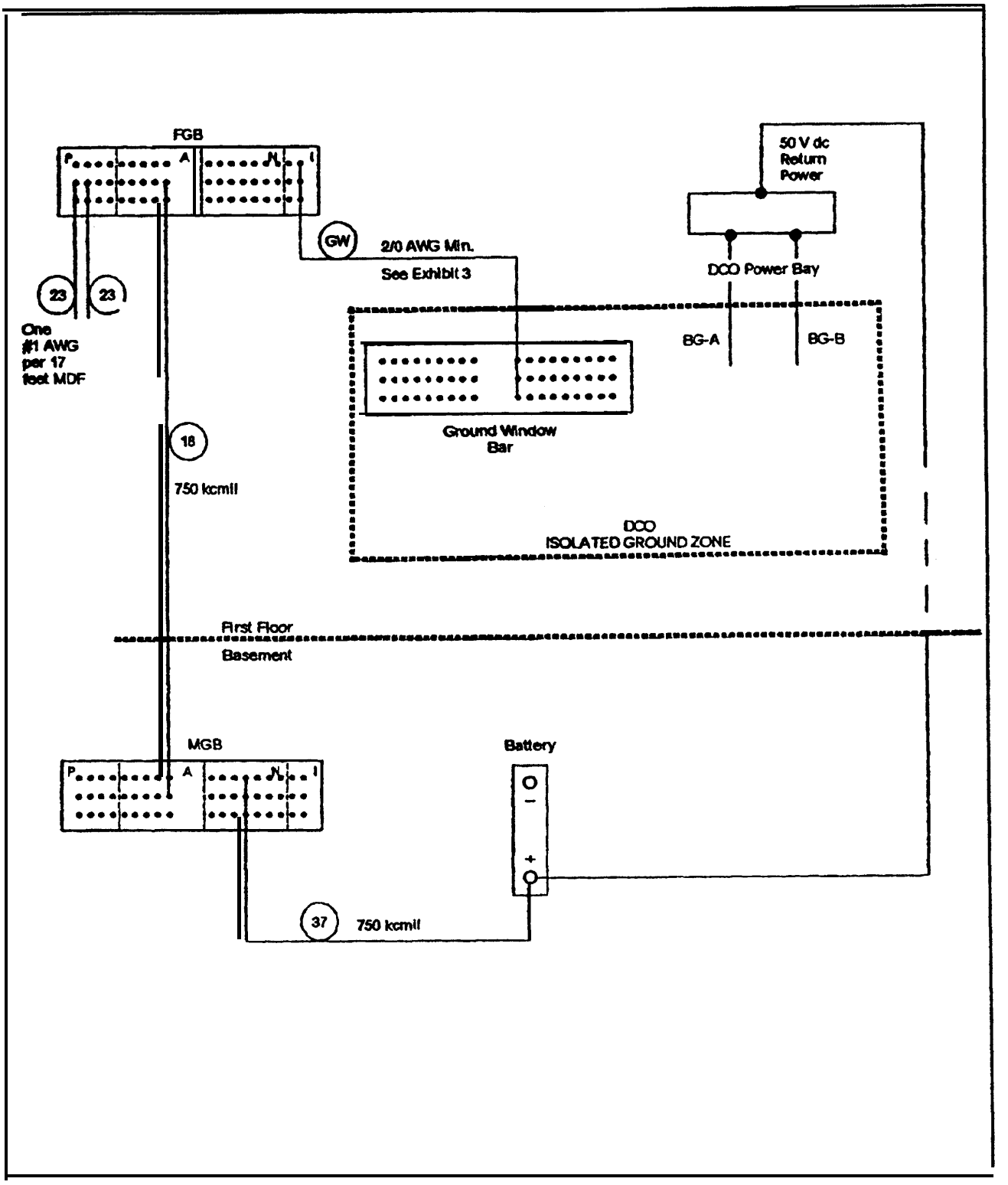

Exhibit 2 – DC Power One Floor Away

From MGB/FGB	To Ground Window Bar GWB	Size .005 Ω 2/0 AWG min.	Length Feet
		2/0 AWG	0 → 61
		3/0 AWB	62 → 77
		4/0 AWG	78 → 98
		250 kcmil	99 → 116
		300 kcmil	117 → 137
		750 kcmil	138 →

Exhibit 3 – DCO Grounding Conductor Sizing