

**Alabama Public Service Commission
Telecommunications Division
Engineering Section
BELL SOUTH CENTRAL OFFICE QUALITY CHECKLIST**

SAFETY

References:

- A: Bell South Central Office Grounding Checklist
- B: Alabama Public Service Commission Telephone Rule T-21
- C. National Electrical Code Article 701

1. Are exit signs posted?

YES__NO__
Comments: _____

2. Are exit routes clear?

YES__NO__
Comments: _____

3. Are evacuation plan drawings posted?

YES__NO__
Comments: _____

4. Are first aid kits available?

YES__NO__
Comments: _____

5. Are materials in First Aid Kit up to date?

YES__NO__
Comments: _____

6. Is there emergency lighting?

YES__NO__
Comments: _____

7. Is there fire protection of some kind?

YES__NO__
Comments: _____

Safety Continued

8. Are hand-held halon extinguishers utilized? Are they accessible and up to date?

YES__NO__

Comments: _____

9. Is there a fire alarm?

YES__NO__

Comments: _____

10. If so where does it alarm?

Comments: _____

11. Is there 911 or E911?

YES__NO__

Comments: _____

12. If so where is the E911 switch?

Comments: _____

13. What counties are served by this switch?

Comments: _____

RECTIFIERS

References:

A: RUS BULLETIN 1751E-001 (FORM 522)

B: ALABAMA PUBLIC SERVICE COMMISSION TELEPHONE RULE T-21

1. Are there spare chargers?

YES__NO__

Comments: _____

2. If one charger is turned off, do other chargers assume the load?

YES__NO__

Comments: _____

3. Are the charger alarms wired and are alarms initiated if the units are turned off?

YES__NO__

Comments: _____

4. Type chargers --model--current capacity

Comments: _____

5. Do chargers have a manual on and off switch?

YES__NO__

Comments: _____

BATTERIES

References:

A: RUS BULLETIN 1753E-001 (Form 522)

B: ALABAMA PUBLIC SERVICE COMMISSION TELEPHONE RULE T-21

C. NATIONAL ELECTRICAL CODE ARTICLE 701

1. Are straps clean and free of tarnish and corrosion?

YES__NO__

Comments: _____

2. Are cells filled to proper level?

YES__NO__

Comments: _____

3. Are battery records up to date?

YES__NO__

Comments: _____

4. Do cells show signs of cracking or warpage?

YES__NO__

Comments: _____

5. What are the brand of batteries and date installed?

Comments: _____

6. Are batteries lead antimony, calcium or Jell?

Comments: _____

7. Are there voltage reading across cells 1-24?

YES__NO--

Comments: _____

8. Does above voltage reading approximate voltage shown on volt meter at power board?

YES__NO__

Comments: _____

Batteries Continued

9. Do the batteries have a reserve capacity in ampere hours, less than four times the current capacity of the largest charger?

YES__NO__

Comments: _____

10. Is the safety board up to date?

YES__NO__

Comments: _____

POWER BOARD

Reference:

A: RUS BULLETIN 1753E-001 (form 522)

1. Does amp meter read approximately the same amount of current drain as the total amount indicated by all chargers collectively?

YES__NO__

Comments: _____

SWITCH ROOM

References:

- A. RUS BULLETIN 1751F-810
- B. RUS BULLETIN 1753E-001 (Form 522).
- C. ALABAMA PUBLIC SERVICE COMMISSION TELEPHONE RULE T-21

1. Does the switch room appear clean, orderly and well kept?

YES__NO__
Comments: _____

2. Are switch filters clean? If so how often are they cleaned?

YES__NO__
Comments: _____

3. Is a trunking diagram available?

YES__NO__
Comments: _____

4. What is the manufactures recommended temperature and humidity?

minimum_____maximum_____

Comments: _____

5. What is the temperature and humidity in the switch room?

Comments: _____

6. Is the office equipped with an alarm sending unit of some type?

YES__NO__
Comments: _____

7. Where are alarms monitored? (For example: service center, contractor, etc.)

Comments: _____

8. Is back up memory for the switch stored off site?

YES__NO__
Comments: _____

RINGING GENERATORS

References:

A. RUS BULLETIN 1753-001 (Form 522)

B. ALABAMA PUBLIC SERVICE COMMISSION TELEPHONE RULE T-21

1. Is there redundant ringing?

YES__NO__

Comments: _____

2. What type of ringing is utilized? (decimonic, synchomonic, harmonic)

Frequency: _____

Output voltage: _____

TRANSMISSION

1. Is the DSX panel present and clearly marked?

YES__NO__

Comments: _____

2. Are all carrier, fiber and DSA electronics within the same areas of the office?

YES__NO__

Comments: _____

3. Are the transmission racks clearly identified as to their function?

YES__NO__

Comments: _____

4. Is the proper test equipment available for carrier, fiber and special service testing?

YES__NO__

Comments: _____

GENERATOR

References:

- A. RUS BULLETIN 1751E-320
- B. NATIONAL ELECTRICAL CODE ARTICLE 700
- C. ALABAMA PUBLIC SERVICE COMMISSION TELEPHONE RULE T-21

1. Does the generator start?

YES__NO__
Comments: _____

2. Are generator records current?

YES__NO__
Comments: _____

3. Who is the manufacture of the generator and what is the kilowatt rating?

Comments: _____

4. Does the frequency meter work?

YES__NO__
Comments: _____

5. Is there a test switch to simulate a commercial power failure?

YES__NO__
Comments: _____

6. Is there a generator alarm and is it working?

YES__NO__
Comments: _____

Main Distributing Frame (MDF)

1. Do all protector strips have modules plugged into each cable pair?
YES__NO__
Comments: _____

2. Are frame blocks covered?
YES__NO__
Comments: _____

3. If not, is there wire, trash, and other dirt present?
YES__NO__
Comments: _____

4. Does frame look neat?
YES__NO__
Comments: _____

5. Is maintenance bag available?
YES__NO__
Comments: _____

6. Is general housekeeping good?
YES__NO__
Comments: _____

BELL SOUTH CENTRAL OFFICE GROUNDING CHECKLIST

1. GROUNDING ELECTRODE SYSTEM/OPGP

A. Check for suitable grounding electrodes:

1. Ground rings or grids

YES__NO__

Comments: _____

2. Ground rods or ground rod arrays

YES__NO__

Comments: _____

3. Structural steel ground grids

YES__NO__

Comments: _____

4. Well casings

YES__NO__

Comments: _____

5. Any combination of the above. Other grounding electrodes are listed in NEC.

YES__NO__

Comments: _____

B. Ring grounds or other approved buried ground arrays around the perimeter of the building are the preferred grounding electrodes. They should utilize:

1. Number 2 AWG bare solid tinned copper buried at least 18 inches below grade.

YES__NO__

Comments: _____

2. Eight foot, 5/8" stainless steel or copper-clad rods spaced 10 to 15 feet apart.

YES__NO__

Comments: _____

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3. All buried connections are exothermic welded or have approved compression connectors.

YES__NO__

Comments: _____

C. Incidental grounds or electrodes should be bonded to the primary electrode; such as:

1. Water pipe bonded to the OPGP bus.

YES__NO__

Comments: _____

2. Buried fuel tanks (unless cathodic protected).

YES__NO__

Comments: _____

3. Other exterior metallic objects that may pose a lightning or power fault hazard (i.e. engine exhaust stack, AC compressors, roof vents.

YES__NO__

Comments: _____

D. Office Principal Ground Point (OPGP)

1. Should be located near the main commercial power service entrance and where other grounding electrodes enter the building, i.e. water pipe, other buried ground arrays, etc.

YES__NO__

Comments: _____

2. The location of the OPGP ground bar should be accessible for inspection and maintenance and should be identified as the "OPGP". **NOTE:** It is recommended that in locations that are using the water pipe as the OPGP, a copper bar mounted on insulators should be installed on the wall close by.

YES__NO__

Comments: _____

3. The minimum size of the OPGP bar should be: 1/4"x 18".

YES__NO__

Comments: _____

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- 4. Check that all the required connections have been properly made to the OPGP bar, the following are typically required:

YES__NO__

Comments: _____

- A. Connection to the central office grounding electrode system (ring ground, water pipe, other buried ground arrays, etc.)

YES__NO__

Comments: _____

- B. Connection to AC neutral in the House Service Panel sized per NEC.

YES__NO__

Comments: _____

- C. Connection to building steel or foundation ground grid

YES__NO__

Comments: _____

- D. Connection to CO ground system. (horizontal and vertical equalizers):

YES__NO__

Comments: _____

- 5. All connectors are two hole compression type terminated on a clean bright surface that has been treated with an anti-oxidant. Proper hardware has been used. Check connectors for tightness.

YES__NO__

Comments: _____

- 6. 145C type tags (or equivalent) denoting far end termination in place where required.

YES__NO__

Comments: _____

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2. AC SERVICE

A. At the Main Service Entrance Panel verify the following:

- 1. Gapless type lightning arrestor(s) (MOV) are provided on the load side of the Main breaker. Leads should be as short and direct as possible (3' or less preferred). The arrestor is equipped for remote alarms and extended to the central office alarm system.

YES__NO__

Comments: _____

- 2. The neutral and equipment ground bars are bonded together and referenced to the OPGP. The Grounding Electrode conductor should be connected as close as where the neutral and ground are bonded possible to this bond. **NOTE:** This is the only location where the neutral and ground for this system are bonded together in the office.

YES__NO__

Comments: _____

B. Check separately derived sources to assure the neutrals are grounded to the nearest ground reference (i.e. transformers, inverters)

YES__NO__

Comments: _____

3. CABLE ENTRANCE FACILITIES (CEF)

A. All cables, including fiber optic cables with metallic members, shall have their sheaths bonded to the central office ground system at or near where they enter the cable vault/building.

YES__NO__

Comments: _____

- 1. All cable sheaths, including fiber optic cables with metallic members, are properly connected into the ground system with a #6AWG conductor or equivalent bonding ribbon. All fiber optic slack coils are on the C.O. side of the bond.

YES__NO__

Comments: _____

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2. All connections are tight.

YES__NO__

Comments: _____

B. There must be a direct low impedance path between the CEF and the OPGP, and between the CEF and the MDF. Check to assure that a minimum 1/0 AWG conductor is run between the CEF ground bar and the OPGP and the CEF and the MDF ground bar. NOTE: the 1/0 AWG may run to the COGB instead of the OPGP if the overall distance is not significantly increased.

YES__NO__

Comments: _____

C. When isolation gaps are provided for corrosion protection, all field side shields are bonded together and all office side shields are bonded together. The office side shields are connected to the central office ground system in addition. Capacitors are always required across isolation gaps.

YES__NO__

Comments: _____

4. C.O. "INTEGRATED" GROUND SYSTEM

A. A C.O. ground system should be established by running the proper size conductor from OPGP to a column or wall mounted copper bus bar on each floor. Check the following:

YES__NO__

Comments: _____

1. Inspect the size of the vertical/horizontal equalizers:

YES__NO__

Comments: _____

a. 4/0 AWG - up to 60 feet

b. 750 kcmil all other and multi-story

2. The vertical/horizontal equalizer is a direct continuous run from the OPGP.

YES__NO__

Comments: _____

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- 3. The vertical/horizontal equalizer shall have no sharp bends, no chokes, and PVC sleeve protection for floor/wall penetrations. Note: Cable holes 12"x 24" are acceptable.

YES__NO__

Comments: _____

- 4. The vertical/horizontal equalizer shall not be run on a cable rack with other office cables. (Power, switchboard, alarm)

YES__NO__

Comments: _____

- B. Inspect the C.O. ground bar(s). Verify that all conductors are properly terminated, tagged, and that all equipment requiring connection to the C.O. ground system is properly connected. The bar should be a minimum 1/4"x 16" copper bar mounted on 2" insulators.

YES__NO__

Comments: _____

- 1. Check the following typical connections:

- a. Minimum 2/0 AWG framework ground conductor for the principal power plant.

YES__NO__

Comments: _____

- b. BDFB where the return bus is not insulated from the framework requires a 750 KCMIL.

YES__NO__

Comments: _____

- c. BDFB where the return bus is insulated from the framework requires a 2/0 AWG.

YES__NO__

Comments: _____

- d. Electronic switching system MGB (ground window) requires a 750 KCMIL conductor.

YES__NO__

Comments: _____

- e. Protector frame (if not connected to the OPGP due to a shorter run) requires a 1/0 AWG minimum.

YES__NO__

Comments: _____

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- f. Cable Entrance Facility conductor (if not connected to the OPGP due to a shorter run) requires a 1/0 AWG minimum.

YES__NO__
Comments: _____

- g. Power plant discharge ground bus for non-switch transport (toll) equipment requires a minimum 350 KCMIL conductor.

YES__NO__
Comments: _____

- h. Engine room ground conductor (if not run to OPGP due to shorter run) required to be a #2 AWG minimum.

YES__NO__
Comments: _____

- I. Toll/Misc. equipment frame ground system: 2/0 AWG minimum main aisle grounding conductor for multiple line-ups. #2 AWG minimum for single line-up #6 AWG minimum for a single bay

YES__NO__
Comments: _____

- j. Conductors from separately derived AC or DC sources.

YES__NO__
Comments: _____

- 2. 145C type (or equivalent) tags denoting far end termination on all conductors requiring same.

YES__NO__
Comments: _____

- 3. All connectors are two hole compression type, terminated on a clean bright surface that has been treated with an anti-oxidant. Proper hardware has been used. Check connectors for tightness.

YES__NO__
Comments: _____

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C. Inspect the engine room ground system:

- 1. Verify the standby engine room grounding. Engine chassis, control cabinet, day tank, battery stand, battery charger, shroud, intake/exhaust louvers, metal fuel piping, etc. should all be grounded to the engine room ground bar or a minimum #2 AWG conductor that is connected to the COGB or OPGP bar.

YES__NO__

Comments: _____

D. Inspect the protector frame ground:

- 1. Verify that there is electrical continuity along the entire length of the protector frame. Check for welded joints or a copper frame bus bar that extends the entire length of the frame.

YES__NO__

Comments: _____

- 2. An overhead frame protector bus shall be bonded to the MDF ground bar (V-1) with a minimum 1/0 AWG conductor.

YES__NO__

Comments: _____

- 3. The MDF framework shall be connected to the COG bar and the MGB (if on the same floor) with minimum 1/0 AWG conductor.

YES__NO__

Comments: _____

E. Inspect power room framework ground system:

- 1. A continuous 2/0 AWG conductor shall be run from the OPGP or COG bar on the same floor as the power plant to the main power line up, and then to the MGB in the Ground Window area.

YES__NO__

Comments: _____

- 2. Individual power frames having distribution fuses or breakers of more than 100 amperes shall be connected to this 2/0 AWG conductor with a 2/0 AWG tap.

YES__NO__

Comments: _____

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- 3. Other power frames in the main power line up shall be tapped to the 2/0 AWG conductor with a #6 AWG, or larger, frame ground conductor.

YES__NO__

Comments: _____

- 4. Power frames and metallic battery stands in other line ups may be connected to the 2/0 AWG conductor with #6 AWG conductors, or to a #2 AWG collector conductor tapped down into individual bays or frames with a #6 AWG conductor.

5. C. O. "ISOLATED" GROUND SYSTEM

- A.** Establishment and maintenance of an isolated ground plane with all connections to ground via a single point ground window is critical to the operation of digital switches. Check for the following:

- 1. All digital/electronic system framework is bonded together in accordance with system requirements and is isolated from the integrated ground plane (floor/integrated ironwork), except for connections at the ground window.

YES__NO__

Comments: _____

- B.** A single MGB (ground window) has been established within one floor of any equipment which is part of the isolated ground plane (-48V power plant excluded). If power plant return bus is the MGB, refer to TR-NWT-000295 figures 5-7 and 5-8. Check the following:

- 1. Ground window/MGB is clearly identified.

YES__NO__

Comments: _____

- 2. All ground window connections are contained within a sphere with a maximum radius of three feet.

YES__NO__

Comments: _____

- 3. Main ground bus (MGB) is an insulated copper bar. When parallel bars are furnished they must not be electrically tied together at both ends so as to form a loop.

YES__NO__

Comments: _____

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- 4. All required connections to the MGB have been made in proper sequence (compare to TR-NWT-000295, figure 5-3).

YES__NO__

Comments: _____

- 5. All leads are properly terminated with two hole, compression type connectors on a clean, bright surface which has been treated with an anti-oxidant compound, and are tagged with a 145C type tag (or equivalent)

YES__NO__

Comments: _____

- 6. All parts of the isolated ground plane shall be located not more than one floor above or below the ground window, and no further than 100 feet horizontally from the ground window. The farthest member of the isolated ground plane can be no more than 200 conductor feet from the COG bar.

YES__NO__

Comments: _____

C. Inspect digital switch power return conductors:

-48V return conductors serving the digital switch (PDC's, etc) are run direct (not connected to the and closely paired with its associated -48V conductor.

YES__NO__

Comments: _____

D. Inspect shared power plant integrated ground power return conductors:

All -48V return conductors serving integrated ground plane loads are routed "through" the ground window and bonded to the MGB. (Should be paired with the -48V conductor)

YES__NO__

Comments: _____

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E. All AC circuits run to/from the isolated ground plane are installed in accordance with the NEC and system requirements: (not required in AC free switches which are the preferred BellSouth application).

1. Installed in continuous metallic raceway with an ACEG (green wire) ground. (ACEG required for each branch circuit)

YES__NO__

Comments: _____

2. Run via ground window; raceway, ACEG and fitting (junction box) bonded to the MGB with a #6 AWG (3 conductor feet max).

YES__NO__

Comments: _____

3. Isolation from walls, columns, ceiling and integrated ground plane equipment is maintained after connection at the ground window.

YES__NO__

Comments: _____

F. All integrated metalwork within 6 feet of the isolated ground plane shall be bonded to the MGB to minimize surge potential differences for personnel protection. Such metalwork includes but is not limited to the following:

1. Metallic stands and desk

YES__NO__

Comments: _____

2. Equipment frames

YES__NO__

Comments: _____

3. Ironwork

YES__NO__

Comments: _____

4. HVAC ducts

YES__NO__

Comments: _____

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- 5. Lighting fixtures
YES__NO__
Comments: _____

- 6. Spare circuit pack cabinets in the integrated ground plane

YES__NO__
Comments: _____

- G.** Using a Clamp-on ammeter, check for AC/DC current flow in single grounding conductors which should not carry current. (i.e. frame and logic grounding conductors)

AC/DC current is less than 1 amp.

YES__NO__
Comments: _____

- H.** The following conductors should be a minimum of three feet from the isolated ground plane:
 - 1. Grounding conductor from the MGB/COG to the MDF

YES__NO__
Comments: _____

 - 2. Vertical/horizontal equalizers

YES__NO__
Comments: _____

 - 3. Wave guides and coax from tower mounted antennas

YES__NO__
Comments: _____

 - 4. Metallic raceways from other systems

- I.** Local test cabinets, remote from the switch, shall be installed as part of the integrated ground plane. This will require that all external power supplies to the cabinet (-48V, 130V, ringing, etc.) Be provided from sources in the integrated ground plane.

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J. Shielded cables; check the following:

1. Grounded only at one end (normally at the equipment end in the integrated ground plane)

YES__NO__

Comments: _____

2. If required by system design to be grounded on both ends, each cable must be routed through the ground window and the shield bonded to the integrated side of the MGB.

YES__NO__

Comments: _____

6. Tower Grounding System

A. Check Exterior Bonds:

YES__NO__

Comments: _____

1. Bonding ring at tower base

YES__NO__

Comments: _____

2. Tower ring bonded to exterior C.O. ground system

YES__NO__

Comments: _____

3. Coaxial cables/wave guides bonded to tower

YES__NO__

Comments: _____

4. Coaxial cables/wave guides bonded to hatch plate

YES__NO__

Comments: _____

5. Roof hatch plates bonded to exterior ring bus

YES__NO__

Comments: _____

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6. Wall hatch plates bonded to exterior C.O. ground system
YES__NO__
Comments: _____

7. Tower lighting power supply conduit bonded to tower
YES__NO__
Comments: _____

B. Check Interior Bonds:

1. Hatch plates bonded to nearest COGB
YES__NO__
Comments: _____

2. Polyphones installed on all coaxial cables
YES__NO__
Comments: _____

3. PolyPhasers bonded to appropriate ground
YES__NO__
Comments: _____

4. Coaxial cables/wave guides bonded to hatch plate
YES__NO__
Comments: _____

5. Radio equipment bonded to nearest COGB
YES__NO__
Comments: _____