

R56 COMPLIANCE AUDIT

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F.1 PURPOSE

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The purpose of the R56 compliance audit is to provide an audit form based on the Motorola Standards and Guidelines for Communication Sites manual (R56) requirements, to ensure the overall performance of individuals and contractors performing or supervising installations.

F.2 SCOPE

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It is the Motorola policy that all contracted installations shall either conform to or exceed the minimum guidelines established in the "Motorola Standards and Guidelines for Communication Sites" manual (R56). As new equipment is developed and requirements are strengthened, the installation procedures are updated in an effort to provide the customer with a fault-free communication system. These checklists will enable management personnel to better understand deficiencies associated with the installation affording them the opportunity to take corrective action.

Motorola provides this audit and the opinions solely for the purpose of assisting in the compliance to Motorola installation standards. No opinions or recommendations expressed in this audit shall result in liability to Motorola for any losses, damages, expenses, claims, causes of action incurred or sustained by the customer for any reasons whatsoever. Any work resulting from this audit process involving electrical systems, panels, automatic transfer switches, conduits or outlets must be completed by a suitably qualified and licensed electrician. All work must be performed by properly trained, licensed and qualified contractors.

3. Specific Deficiencies / Reasons

In this area, identify and explain any specific deficiencies that were observed at the site. After this is completed, proceed to the explanation of N/A entries.

Example:

2.b: Cable runway system does not meet ceiling separation requirements. A separation of 10 cm (4 in.) was measured.

4. Explanation of N/A Entries

In this area, identify and explain any not applicable (N/A) audit points that were identified. After this is completed, send the cover sheet and a copy of the R56 Compliance Audit to the Project Manager.

Example:

3.o.15: There are no security bars or metallic window frames at this location.

F.3.3 R56 COMPLIANCE AUDIT

The R56 Compliance Audit starts on page F-7. Begin by filling in all the required information at the top of the page. Once this has been completed, proceed with the audit.

The Reference column on the audit form provides references to the applicable Motorola requirements within the "Motorola Standards and Guidelines for Communication Sites" (R56) manual.

The remainder of the audit is divided into five separate segments for marking as follows:

R56 Compliance Audit Cover Sheet

Customer Name: _____

Equipment Location: _____

Inspector's Name _____

Inspection Results: Motorola _____% Customer: _____% Date: _____

Site/system Description:

Specific Deficiencies/reasons:

Explanation of N/A Entries:

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Customer Name:				Project Name:				
Project Manager:				Project #:				
Inspector's Name:				Audit Date:				
Site Name:								
DESCRIPTION	Motorola Responsibility		Customer Responsibility		N/A	Motorola Failure	Customer Failure	Reference
	Passed	Failed	Passed	Failed		Date Corrected	Date Corrected	
1 GENERAL								
a. A copy of the Project Manager's Compliance Sheet has been completed, certified and supplied for attachment to this audit.								
b. Project Manager's Compliance Sheet shows that all appropriate requirements have been met.								
TOTALS FOR SECTION								
2 BUILDING DESIGN AND INSTALLATION								
a. The ceiling height is sufficient to meet requirements for equipment installation.								Paragraph 5.5.1
b. Cable runway system meets the proper installation requirements.								Paragraph 5.10
c. The floor is sealed as required.								Paragraph 5.3.2
d. Transmission line entry ports, holes or openings which penetrate the outer surface of the building have been properly sealed.								Paragraph 5.7
e. Adequate lighting requirements have been met.								Paragraph 5.11
f. Minimum required fire suppression equipment is properly installed.								Paragraph 5.12
g. A first aid kit is available and meets requirements.								Paragraph 5.12.6.1
h. Required personal protective safety items are available for servicing batteries which require such items.								Paragraph 5.12.6.2
i. A telephone, microwave link, or cellular phone has been made available.								Paragraph 5.12.8
j. Phone numbers of importance are posted at the site.								Paragraph 5.12.8
k. The minimum required signage is posted at the site.								Paragraph 5.13
TOTALS FOR SECTION								

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	Passed	Failed	Passed	Failed		Date Corrected	Date Corrected	
3 EXTERNAL GROUNDING								
a. An External Ground Bus bar (EGB) of suitably sized material is properly installed at the transmission line entry point.								Paragraph 6.3.3
b. The EGB grounding electrode conductor has been properly installed.								Paragraph 6.3.3
c. When a tower ground bus bar (TGB) is used, it meets the proper installation and bonding requirements.								Paragraph 6.3.4
d. Each transmission line outer shield is properly bonded to the tower or TGB at the transition of the vertical transmission line run with a weather sealed transmission line grounding kit.								Paragraph 6.4.6
e. Each transmission line outer shield is properly bonded to the EGB with a weather sealed transmission line grounding kit.								Paragraph 6.4.6
f. The tower is properly bonded with the required number of B48 grounding conductors.								Paragraph 6.4.5
g. Ice bridges / cable supports have been properly bonded to the EGB.								Paragraph 6.4.3
h. Each ice bridge / cable support post has been properly bonded to the grounding electrode system.								Paragraph 6.4.3
i. Ice bridges / cable supports have been properly isolated from the tower.								Paragraph 6.4.3
j. Guy wires are properly bonded and their grounding conductor maintains a continuous vertical drop to the grounding electrode.								Paragraph 6.4.5
k. Fencing has been properly bonded to a ground system as required.								Paragraph 6.4.2
l. Each fence gate is properly bonded to its supporting fence post as required.								Paragraph 6.4.2
m. Gate supporting fence posts are properly bonded as required.								Paragraph 6.4.2
n. Generator and support skids have been properly bonded as required.								Paragraph 6.4.1
o. Items listed below are properly bonded to the grounding electrode system as required.								Paragraph 6.4.1
o.1 Metallic entry ports								Paragraph 6.4.1

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o.2 Cable conduits or raceways								Paragraph 6.4.1
o.3 Metallic piping (water, gas, electrical conduits, etc.)								Paragraph 6.4.1
o.4 Air conditioner units								Paragraph 6.4.1
o.5 Metal siding and/or roofing on buildings								Paragraph 6.4.1
o.6 Vent covers and grates								Paragraph 6.4.1
o.7 Metal fuel storage tanks (above or below ground)								Paragraph 6.4.1
o.8 Building skid or pier foundations								Paragraph 6.4.1
o.9 Anchors on prefabricated buildings								Paragraph 6.4.1
o.10 Metallic structures for antenna supports, light fixtures, etc.								Paragraph 6.4.1
o.11 Satellite dish supports								Paragraph 6.4.1
o.12 GPS antenna supports								Paragraph 6.4.1
o.13 Hand and safety rails								Paragraph 6.4.1
o.14 Ladders and safety cages								Paragraph 6.4.1
o.15 Security bars and window frames								Paragraph 6.4.1
o.16 Main electrical ground								Paragraph 6.4.1
o.17 Main telco ground								Paragraph 6.4.1
p. Approved bonding techniques have been used for the connection of dissimilar metals.								Paragraph 6.5.2
q. Approved methods have been used for conductor connection and termination.								Paragraph 6.5
r. Bonding surfaces for lugs and clamps are free of paint and corrosion and a conductive anti-oxidant compound has been applied.								Paragraph 6.5
s. All painted or galvanized bonding surfaces for exothermic welds were cleaned and painted to inhibit rusting.								Paragraph 6.5
t. All grounding conductors have been routed towards the EGB, TGB or the grounding electrode system and the minimum bending radius has been observed.								Paragraph 6.3.2+K84
u. Grounding conductors are routed as straight as possible and protected from physical damage as required.								Paragraph 6.3.2
v. Grounding conductors maintain the minimum required separation from other cable groups.								Paragraph 6.3.2.3

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w. Grounding conductors are securely fastened as required.								Paragraph 6.4.9
x. Grounding conductors meet or exceed the conductor size requirements.								Paragraph 6.3.2.3
y. Braided grounding conductors are not used anywhere in the external ground system.								Paragraph 6.3.2.1
TOTALS FOR SECTION								

4 INTERNAL GROUNDING								
DESCRIPTION	Motorola Responsibility	Customer Responsibility	N/A	Motorola Failure	Customer Failure	Date Corrected	Date Corrected	Reference
a. A properly sized Master Ground Bus Bar (MGB) is installed as required.								Paragraph 7.2
b. The MGB grounding electrode conductor has been properly bonded and routed towards the grounding electrode system.								Paragraph 7.2
c. All conductor connections to the MGB follow approved connection methods.								Paragraphs 7.4
d. Where required a Sub System Ground Bus Bar (SSGB) has been properly installed.								Paragraph 7.2.2
e. The SSGB has been bonded back to the MGB as required.								Paragraph 7.2.2
f. All conductor connections to the SSGB follow the approved connection methods.								Paragraphs 7.4
g. Where required an Internal Perimeter Ground Bus (IPGB) is properly installed.								Paragraph 7.3.2
h. Only ancillary equipment is bonded to the IPGB.								Paragraph 7.3.5.3
i. Each ancillary support apparatus is properly bonded to the IPGB, MGB, or SSGB.								Paragraph 7.3
j. Items listed below are properly bonded to the MGB, SSGB, or IPGB using approved connection methods.								Paragraph 7.3.2
j.1 Piping systems								Paragraph 7.3.2.4
j.2 Steel roof trusses								Paragraph 7.3.2.4
j.3 Exposed support beams or columns								Paragraph 7.3.2.4
j.4 Ceiling grids								Paragraph 7.3.2.4
j.5 Raised equipment floor support structure at the proper intervals.								Paragraph 7.3.2.4
j.6 Any exposed metallic building materials (metal siding)								Paragraph 7.3.2.4

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k. Surge Suppression Device (SPD) metal housings are bonded to the MGB, SSGB or IPGB as required.								Paragraph 7.3.5.8
l. Separately derived AC electrical systems are bonded to the MGB or SSGB as required.								Paragraph 7.3
m. Primary telephone, control, and data network circuit SPDs are properly installed and bonded to the MGB or SSGB as required.								Paragraph 7.3.5.6
n. RF transmission line SPDs are bonded to the MGB or a separate equipment area SSGB as required.								Paragraph 7.3.5.5
o. Cable runways are bonded to the MGB or SSGB as required.								Paragraph 7.3.3.4
p. Each cable runway section is bonded to the adjoining section as required.								Paragraph 7.3.4
q. Ground bus conductors and their extensions are sized as required.								Paragraph 7.3.1.2
r. All ground bus conductors, ground bus extensions and equipment grounding conductors are routed towards the MGB or SSGB as required.								Paragraph 7.3.1
s. Bonding connections to a ground bus or its extensions have been properly insulated as required.								Paragraph 7.3.1.3
t. Cabinets have been properly bonded back to the MGB, SSGB or ground bus by approved methods.								Paragraph 7.2.2.4
u. Racks have been properly bonded back to the MGB, SSGB or ground bus by approved methods.								Paragraph 7.2.2.4
v. Any RGB located within a cabinet or rack is properly bonded back to the MGB, SSGB or ground bus as required.								Paragraph 7.2.2.4
w. Individual system component chassis equipment is properly bonded as required.								Paragraph 7.2.2+K117.4
x. Secondary telephone, control, and data network circuit SPDs are properly installed and bonded back to MGB or SSGB as required.								Paragraph 7.3.5.6
y. All required control center and dispatch equipment is properly bonded back to the MGB, SSGB, or ground bus conductor as required.								Paragraph 7.6
TOTALS FOR SECTION								

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	Passed	Failed	Passed	Failed		Date Corrected	Date Corrected	
q. Battery conductors are enclosed in PVC, metallic conduit or raceways.								Paragraph 8.8.8
r. A battery disconnect and suitable circuit protection device has been installed as required.								Paragraph 8.8.8
s. When a standby power generator has been installed, it meets the proper installation requirements.								Paragraph 8.9.2
t. Standby generators are located in areas only accessible by authorized personnel.								Paragraph 8.9.2
u. Standby generators have an adequate area provided for servicing.								Paragraph 8.9.2
v. Fuel storage tanks for standby generators are located within a secured area.								Paragraph 8.9.3
w. A dedicated electrical circuit has been provided at the generator.								Paragraph 8.9.5
x. A transfer switch of the proper ampacity rating has been installed to perform the switching between commercial power and standby generator power.								Paragraph 8.9.4
y. A main service disconnect has been installed as required.								Paragraph 8.9.4
z. Electrical panelboard ampacity ratings are properly coordinated.								Paragraph 8.9.4
TOTALS FOR SECTION								

6 · TRANSIENT VOLTAGE SURGE SUPPRESSION

a. A Type 1 SAD/MOV surge protection device (SPD) is installed as required.								Paragraph 9.4.2.2
b. A Type 2 MOV surge protection device (SPD) is installed as required.								Paragraph 9.4.2.3
c. Primary SPDs for telephone circuits are installed as required.								Paragraph 9.5.1
d. Secondary SPDs for telephone circuits are installed as required.								Paragraph 9.5.2
e. Primary SPDs for control circuits are installed as required.								Paragraph 9.5
f. Secondary SPDs for control circuits installed as required.								Paragraph 9.5

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	Passed	Failed	Passed	Failed		Date Corrected	Date Corrected	
g. Primary SPDs for data network circuits are installed as required.								Paragraph 9.5
h. Secondary SPDs for data network circuits are installed as required.								Paragraph 9.5
i. All RF transmission lines, including unused spares, have coaxial RF type SPDs properly installed as required.								Paragraph 9.6
j. Where a tower top amplifier has been installed, the sample port and its control cables have SPDs installed as required.								Paragraph 9.8
k. Tower lighting system AC power and data/alarm circuits have SPDs properly installed as required.								Paragraph 9.8
TOTALS FOR SECTION								

7 EQUIPMENT INSTALLATION								
a. Equipment spacing and aisle widths conform to guidelines.								Paragraph 11.3.1
b. Equipment is level and plumb.								Paragraph 11.4.5
c. Equipment is square with surrounding equipment and walls.								Paragraph 11.4.5
d. Where applicable, seismic installation practices have been observed.								Paragraph 11.4.1
e. Cabinets and racks are secured as required.								Paragraph 11.6
f. Cables and cable groups of different function maintain minimum separation of 5 cm (2 in.) as required.								Paragraph 11.8.1
g. RF cables meet or exceed minimum bending radius requirements.								Paragraph 11.8.9
h. Plenum-rated cables are installed as required.								Paragraph 11.8.2
i. Proper cable lengths are used.								Paragraph 11.8.1.2
j. Cables are properly secured at the required intervals.								Paragraph 11.8.1.1
k. AC power conductors installed on cable runway systems meet installation requirements.								Paragraph 11.8.4+K178
l. Cables are properly identified with a standard, double-ended system.								Paragraph 11.8.13

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	Passed	Failed	Passed	Failed		Date Corrected	Date Corrected	
m. Distribution frame wiring conforms to the proper punch-down or wire-wrap techniques.								Paragraph 11.8.12
n. CAT-5 cables maintain the proper separation from AC power cables.								Paragraph 11.8.7.4
o. CAT-5 cables do not have any sharp bends.								Paragraph 11.8.7.4
p. CAT-5 cables meet all other installation requirements.								Paragraph 11.8.7
q. Cables installed below raised flooring systems are properly installed.								Paragraph 11.8.7
r. Cables installed above suspended ceilings are properly installed.								Paragraph 11.8.2
s. Electrostatic discharge practices are observed as required.								Paragraph 11.9
TOTALS FOR SECTION								

AUDIT TOTALS	MOTOROLA		CUSTOMER		Total N/A
	Number of Passed	Number of Failed	Number of Passed	Number of Failed	