



DEFENSE INFORMATION SYSTEMS AGENCY

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DISA CIRCULAR 350-195-2*

TESTS AND EVALUATIONS

Electric Power Systems for Department of Defense Information Network (DODIN) Facilities

1. **Purpose.** This Circular assigns responsibilities for electric power systems for Department of Defense information network (DODIN) facilities. It provides guidance on proper maintenance, load management and analysis, and operational testing of electric power systems for DODIN facilities. It also advises of the training required for personnel assigned to operate or maintain electrical power systems for DODIN facilities.
2. **Applicability.** This Circular applies to the Defense Information Systems Agency (DISA), Military Departments (MILDEPs), defense agencies, and to all activities responsible for the operation and maintenance (O&M) of the telecommunications and information processing components of the DODIN facilities. More specifically, this Circular applies to those DODIN facilities that are assigned an operational or direct operational support mission and rely on auxiliary power systems (standby generators, Uninterruptible Power Systems [UPS] etc.) to ensure continued operation during periods of primary power loss.
3. **Authority.** This Circular is published in accordance with the authority contained in DoD Directive 5105.19, Defense Information Systems Agency (DISA), 25 July 2006.
4. **References.**
 - 4.1 MIL-HDBK-470A, Volume I, Designing and Developing Maintainable Products and Systems, 31 May 2012.
 - 4.2 DoD Instruction 6055.1, DoD Safety and Occupational Health (SOH) Program, 19 August 1998.
 - 4.3 MIL-STD-882E, System Safety, 11 May 2012.
 - 4.4 DISAC 310-70-1, Global Information Grid (GIG) Technical Control, 21 April 2012.
5. **Objectives.** The objectives of this Circular are to (1) ensure a high state of readiness and performance of electric power systems that support DODIN facilities assigned an operational or direct operational support mission, (2) maintain operator proficiency in the operation and use of power systems, (3) determine and monitor the capability of existing electric power systems to satisfy facility electric power requirements, and (4) provide operational and technical information to form the basis for timely correction of noted deficiencies.

6. Responsibilities.

6.1 Heads of Military Departments (MILDEPs) and Defense Agencies. The heads of the MILDEPs and defense agencies ensure compliance with the provisions of this Circular and implement corrective actions for deficient power systems.

6.2 DISA Principal Director for Enterprise Information Services (EIS) (for the Core Data Centers [CDCs]); DISA Principal Director for Operations (OP) (for telecommunications facilities in the continental United States [CONUS], Central and South America and Central Area [Southwest Asia]); and Commanders of DISA-PAC, DISA-EUR, DISA-CONUS, DISA CENTCOM, JSSC Pentagon, and DISA Command Center (DCC). These individuals shall:

6.2.1 Establish guidelines for reporting the results of electric power exercises.

6.2.2 Monitor, within their geographical area of responsibility (AOR), compliance with this Circular.

6.2.3 For extenuating circumstances, grant to DODIN facilities an exemption to electric power tests and exercises. (Exemptions may be temporary or permanent in nature, depending on the circumstances. All exemptions shall be coordinated with lateral O&M organizations. [Refer to paragraph 11 for further details].)

6.2.4 Provide, as necessary, specific implementing guidance to subordinate DISA activities and O&M agencies to meet unique circumstances within an individual AOR.

6.2.5 Recommend to O&M agencies appropriate corrective actions for noted deficiencies in electric power systems and equipment.

6.2.6 Provide support and direction, as needed, to resolve scheduling conflicts with operational requirements created by preventive maintenance activities and operational tests.

6.3 Department of Defense Information Network (DODIN) and Core Data Center (CDC) Commanders and Chiefs. These individuals shall:

6.3.1 Ensure the prescribed inspections, tests, and exercises, as described in paragraphs 7 through 9, are scheduled and conducted by qualified facility personnel or contractors or by personnel from the host installation. (It is the responsibility of the O&M agency to properly conduct these inspections, tests, and exercises, or to ensure its agent, in the case of contracted O&M, do so.)

6.3.2 Document, report, and retain the results of inspections, tests, and exercises, as prescribed in the O&M agency's preventive maintenance program.

6.3.3 Fully coordinate with subordinate, lateral, higher headquarters, and all connected facilities and local users on dates and times for power exercises and maintenance.

6.3.4 Provide documented results of inspections, tests, and exercises, as requested for tracking trends and analysis of maintenance concerns. (The CDC Commanders and Chiefs shall provide results to the EIS Chief, Facilities Maintenance (ES621). The DODIN facilities that are operationally under DISA's control shall provide results to the OP Chief, Quality Management Branch (OP5). All other DODIN facilities shall provide results to their O&M agency.)

7. Preventive Maintenance.

7.1 A reliability centered preventive maintenance program that complies with National Fire Protection Agency (NFPA) 70B, Recommended Practice for Electrical Equipment Maintenance, and its referenced publications, shall be in place by the DODIN facility O&M agency. Minimum recurring electrical maintenance tasks and frequency standards are identified in the enclosure. The tasks in the enclosure shall be further developed by the O&M agency, as appropriate, to support the specific missions and infrastructure hosted within its facility(ies).

7.2 Generator preventive maintenance is to be performed by utilizing the generator manufacturer's recommended maintenance, NFPA 110, Standard for Emergency and Standby Power Systems, and the applicable requirements of volume I of Military Handbook (MIL-HDBK)-470A (reference 4.1) .

7.3 An electrical safety plan shall be used to support preventive maintenance that requires energized electrical testing, tasks and procedures. The electrical safety plan shall comply with NFPA 70E, Standard for Electrical Safety in the Workplace; applicable sections of DoDI 6055.1 (reference 4.2); and Military Standard (MIL-STD)-882 (reference 4.3).

7.4 Component and system operational and replacement status shall be documented in the maintenance records.

7.5 Additional tasks or preventative maintenance tasks, as outlined in the enclosure, may be performed by the O&M agency or performed on a more frequent basis. Consideration shall be taken to ensure the additional tasks and increased frequencies conform to accepted industry and government practices without presenting unnecessary risk to the mission or creating unsafe working environments.

7.6 Inspection reports, deficiencies, operational tests, and system trends shall be included by the O&M agency in the preventive maintenance records.

7.7 Installation of battery monitoring systems on battery systems rated at greater than 30kVA is encouraged.

7.8 Reports and documentation to support development, implementation, and execution of preventative maintenance shall be completed by the O&M agency and made available upon request. The minimum documents that must be made available upon request are preventative maintenance documentation for mechanical, electrical, and grounding; as-built documentation or mechanical, electrical, and grounding; list of all equipment included in the preventative maintenance; and service reports including chiller maintenance, computer room air conditioner maintenance, chilled water pump maintenance, cooling tower maintenance, condenser pump

maintenance, uninterruptible power supply (UPS) maintenance, rectifier maintenance, UPS and rectifier battery maintenance (all installation of battery string), generator maintenance, building automation maintenance, electrical distribution maintenance, and power systems supporting optical transport equipment.

7.9 Corrective maintenance work orders shall be opened or contract actions taken by DODIN facility O&M agencies within 72 hours of determining that an unscheduled maintenance action is needed on equipment covered by preventative maintenance.

7.10 Power systems that directly support or are considered a subset of the DODIN optical transport system shall be maintained, regardless of location, by DISA, in accordance with (IAW) this Circular, and as recommended by the equipment's manufacturer.

8. Load Management and Analysis.

8.1 The electric power system shall be evaluated to identify system loading limitations for utility transformers and service entrance switchboards and switchgear; generator systems; UPS and batteries; DC rectifier plants and batteries; generator and UPS distribution paths; electrical distribution to essential mechanical systems; power systems directly supporting or connected to DODIN equipment. Loading analysis is the responsibility of the O&M agency.

8.1.1 Loading limitations shall be limited to 85 percent of the smallest distribution component, distribution path, or system rating for worst case electrical distribution when redundant components have failed or been switched by the operator over to a single path. (Refer to the enclosure for load evaluation intervals.)

8.1.2 The electrical loads associated with each electrical system routinely and systematically are to be recorded.

8.2 The documented electrical loads are to be reviewed and compared with the electrical system limitations to identify operational limitations, risks, and need for programmatic funding of electrical system modifications or upgrades.

9. Operational Testing.

9.1 Generator sets will be tested IAW NFPA110, Standard for Emergency and Standby Power Systems, at a frequency not less than those outlined in the enclosure. Generator exercises should be scheduled at a recurring day and time and be no shorter than 1 hour in duration. All scheduled power interruptions must be conducted IAW the provisions of DISAC 310-70-1 (reference 4.4).

9.2 All generator plant and UPS sequences of operation will be revalidated every 2 years by performing multiple tests of the system to demonstrate operation of the system's sequences under the system's designed parameters.

9.3 All UPS bypass and distribution tie breaker circuits will be operated at the frequencies outlined in the enclosure.

9.4 All operational tests will be documented IAW each O&M agency's directed preventative maintenance.

10. Training.

10.1 All personnel assigned to operate electrical power systems that support DODIN facility operations shall be trained and be intimately familiar with O&M of the equipment and operator level troubleshooting of the equipment.

10.2 All personnel assigned or contracted to maintain electrical power systems that support DODIN facility operations must be trained and demonstrate the ability to perform troubleshooting and repair of the systems from the operator level up to and including the system software, components, and configurations.

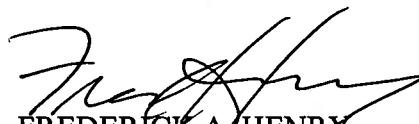
11. Exemptions.

11.1 An exemption to comply with the scheduling specified in the enclosure for certain unique situations, like unmanned facilities, may be obtained from the DISA Principal Director for Enterprise Information Services (EIS); the DISA Principal Director for Operations (OP); or the Commanders of DISA-PAC, DISA-EUR, DISA-CONUS, DISA CENTCOM, and JSSC Pentagon, as appropriate. Complete justification must be provided to substantiate the request. Inspections, reporting, and record keeping are still required. In all cases, exemptions shall be revalidated annually.

11.2 A exemption to comply with the scheduling specified in the enclosure may be obtained if the auxiliary electric power system successfully transferred load to the system supported by the intended generator loads and lasted for a minimum of 1 hour and occurred within 14 days of the scheduled operational test. In this case, the scheduled operational test is not required, although all reporting and record keeping requirements still pertain.

12. **Changes.** Recommended changes to this Circular, together with full and complete supporting rationale, should be sent to Chief, Facilities Maintenance, Enterprise Information Services Directorate (EIS), Attn: Facilities Branch (ES62), P.O. Box 4598, Greenwood Village, CO 80155-4598, or to disa.denver.esd.list.dl-facilities@mail.mil.

13. **Additional Guidance.** The DISA Principal Director for Enterprise Information Services (EIS); divisions within the DISA Principal Director for Operations (OP); and Commanders of DISA-PAC, DISA-EUR, DISA-CONUS, DISA CENTCOM, and JSSC Pentagon may provide additional specific implementation guidance to DODIN and CDC locations within their AOR. Such guidance must be provided to Facilities Branch (ES62), Enterprise Information Services Directorate (EIS), for approval, prior to publication.


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Chief of Staff

SUMMARY OF SIGNIFICANT CHANGES. This revision expands the focus from auxiliary power systems to include all critical components of Department of Defense Information Network (DODIN) electric power systems. System testing and preventive maintenance requirements, performance of load management and analysis, and identification of appropriate training requirements are now addressed in separate paragraphs. Minimum maintenance standards for DODIN electric power systems to comply with industry standards are now included an enclosure. Reference to the Department of Defense Information Network (DODIN) as opposed to Global Information Grid (GIG) is now included.

*This Circular replaces DISAC 350-195-2, 14 December 2009, and must be reissued, canceled, or certified current within 5 years of its publication. If not, it will expire 10 years from its publication date and be removed from the DISA issuance postings.

OPR: ESD - disa.denver.esd.list.dl-facilities@mail.mil

DISTRIBUTION: P

Enclosure

Minimum Maintenance Standards for DODIN Electric Power Systems

Functional Test	Interval							Other	
	Weekly	Monthly	Quarterly	Semi Annual	Annual	Every 2 Year	Every 3 Year		
Engineering Studies									
Coordination study									Every 5 years and in conjunction with electrical system modifications
Short circuit study									Every 5 years and in conjunction with electrical system modifications
Arc flash analysis									Every 5 years and in conjunction with electrical system modifications
Utility (Medium Voltage) Systems									
Service entrance load measurements			X						
Medium voltage conductors and connections									
Visual inspection						X			
Infrared scan						X			
Very low frequency or Hi-pot test (DC)								X	

Functional Test	Interval							Other				
	Weekly	Monthly	Quarterly	Semi Annual	Annual	Every 2 Year	Every 3 Year					
Utility (Medium Voltage) Systems												
Protective relays												
Test (timing, pickup, time delay)											X	
Check settings											X	
Dry type transformers												
Visual inspection								X				
Infrared scan								X				
Insulation resistance (power factor)											X	
De-energized cleaning and testing											X	
Oil filled transformers												
Visual inspection										X		
Infrared scan									X			

Functional Test	Interval							Other
	Weekly	Monthly	Quarterly	Semi Annual	Annual	Every 2 Year	Every 3 Year	
Utility (Medium Voltage) Systems								
					X			After transformer fuse or OCPD activation due to fault
						X		After transformer fuse or OCPD activation due to fault
							X	
							X	
Low Voltage (<600V) Systems								
Mechanical electrical distribution load measurements					X			
Low voltage conductors and connections						X		
Splices in conductors that support mission critical equipment							X	

Functional Test	Interval							Other	
	Weekly	Monthly	Quarterly	Semi Annual	Annual	Every 2 Year	Every 3 Year		
Low Voltage(<600V) Systems									
Dry type transformers									
Infrared scan					X				
Switchgear									
Infrared scan					X				
De-energized cleaning and testing								X	
Test alarms and remote monitoring							X		
Backup PLC and system programs/software							X		After all changes in program
Control batteries and battery charger									
Visual inspection	X								
Test batteries							X		
Instruments and metering									X
Fuses and fuse holders								X	

Functional Test	Interval							Other	
	Weekly	Monthly	Quarterly	Semi Annual	Annual	Every 2 Year	Every 3 Year		
Low Voltage(<600V) Systems									
Draw-out type breakers									
Operate breaker					X				
Internal inspection of the breaker							X		
Test and lubricate breaker							X		
Insulation resistance test							X		
Test trip unit (primary or secondary injection)								X	
Trip unit settings								X	
Contact conductivity test								X	
Molded case circuit breakers									
Operate breaker							X		

Functional Test	Interval							Other	
	Weekly	Monthly	Quarterly	Semi Annual	Annual	Every 2 Year	Every 3 Year		
Low Voltage(<600V) Systems									
Test trip unit (primary or secondary injection)								X	
Panel boards									
Infrared scan					X				
Protective relays									
Test (timing, pickup, time delay)								X	
Check settings								X	
UPS System									
UPS Output Load Measurements	X								
Visual inspection	X								
Preventive maintenance per manufacturers recommendations					X				X

	Functional Test	Interval							
		Weekly	Monthly	Quarterly	Semi Annual	Annual	Every 2 Year	Every 3 Year	Other
UPS System									
	Transfer of UPS system to bypass						X		
	Test alarms and remote monitoring				X		X		
	VRLA batteries Per IEEE 1188			X					
	Wet cell batteries Per IEEE 450			X					
Power Systems Directly Supporting DODIN Equipment									
	Rectifiers and Battery Chargers	X							
	Visual inspection	X							
	Preventive maintenance per manufacturers recommendations					X		X	
	Load test of batteries using DODIN equipment as load						X		
	Test alarms and remote monitoring					x		X	

Functional Test	Interval							
	Weekly	Monthly	Quarterly	Semi Annual	Annual	Every 2 Year	Every 3 Year	Other
Power Systems Directly Supporting DODIN Equipment								
VRLA batteries			X					
Wet cell batteries			X					
Generator Plant								
UPS output load measurements			X					
Visual inspection (temp > 32°F)		X						
Visual inspection (temp < 32°F)								Twice Per Week
Test alarms and remote monitoring					X			
Preventive maintenance per manufacturer recommendations			X	X	X			
Generator								
Vibration analysis (standby systems)					X			

Functional Test	Interval							
	Weekly	Monthly	Quarterly	Semi Annual	Annual	Every 2 Year	Every 3 Year	Other
Generator Plant								
Vibration analysis (continuous systems)				X				
Batteries and battery charger								
Test batteries				X				
Fuel System								
Visual inspection	X							
Test					X			
Operational Tests								
Generator								
Operational run utilizing control test functions (with building load)		X				X		Full load test with load banks should be performed annually
Utility fail test			X					After repair or modification to the controls of the generator plant