U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

Air Traffic Organization Policy

ORDER JO 6950.2F

Effective Date:
04/03/2024

SUBJ: Electrical Power Policy Implementation at National Airspace System Facilities

1. The primary purpose of this order is to provide direction for implementing the electrical power policy at National Airspace System (NAS) facilities. This order is a companion order to JO 6030.20, Electrical Power Policy.

2. This order identifies:

a. The Power System Architectures most cost effectively meeting the performance requirements of NAS Staffed Infrastructure Facilities.

b. The preapproved, usual, and prevailing power system configurations/Power Source Codes for Federal Aviation Administration infrastructure facilities, and NAS Systems and equipment.

c. This order provides NAS Change Proposal requirements for power-conditioning devices installed on the facility critical bus uninterruptible power supply.

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Change History

1. Originator Name and Address AJW-22, Power Services Group	2. [X] Proposed	3. Code Identification	4. Document No. JO 6950.2F
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This notice informs recipients that the standard identified by the number (and revision letter) shown in block 4 has been changed. The pages changed by this DCN (being those furnished herewith) carry the same date as the DCN. The page numbers and dates listed below in the summary of changed pages, combined with non-listed pages of the original issue of the revision shown in block 4, constitute the current version of this Order.

13. DCN No.	14. Pages changed	S*	A/D*	15. Date
JO 6950.2F	Various pages – Updated hypertext links to external files and sites (where necessary) throughout the document			05/01/2023
JO 6950.2F	Page 3-1 – Updated paragraph 3-1c – Unstaffed Infrastructure Facilities, power configuration existing facilities			05/01/2023
JO 6950.2F	Page 3-3 – Added Section 3.7 – Central Control Monitoring System			05/01/2023
JO 6950.2F	Page 4-2 – Updated Section 4.5, Instrument Flight Rules (IFR) Category (Cat) II/III			05/01/2023
JO 6950.2F	Page 5-1 – Updated paragraph 5-2a(3) – Closed transition switching			05/01/2023
JO 6950.2F	Page 5-1 – Updated paragraph 5-2b(1) – Battery standby power systems, renewable sources			05/01/2023
JO 6950.2F	Page 5-2 – Updated paragraph 5-2b(3) – Sizing of battery standby power systems			05/01/2023
JO 6950.2F	Page 5-3 – Updated paragraphs 5-4b and 5-4c for Power conditioning devices and NCP requirements			05/01/2023
JO 6950.2F	Page 5-3 – Updated Section 5-4 paragraphs a through d – revised paragraph order			05/01/2023
JO 6950.2F	Pages A-1 thru A-5 – Updated Appendix A definitions and acronyms			05/01/2023
JO 6950.2F	Pages B-1 thru B-10 – Updated Appendix B table content			05/01/2023
JO 6950.2F	Page D-2 – Updated Appendix D Table 4 and associated notes			05/01/2023

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Chapter 1. General Information

1-1. Purpose of This Order. This order provides direction for electrical power policy implementation at the National Airspace System (NAS) facilities in accordance with the latest version of Order JO 6030.20, Electrical Power Policy.

a. This order identifies:

(1) The Power System Architectures most cost-effectively meeting the performance requirements of NAS Staffed Infrastructure Facilities.

(2) The preapproved, usual, and prevailing power system configurations/Power Source Codes for Federal Aviation Administration (FAA) infrastructure facilities, and NAS Systems and equipment.

(3) The policies regarding use of alternative power system configurations/Power Source Codes.

b. This order also defines the Power Source Codes (PSC) for use in Facility, System, and Equipment Profile (FSEP). These codes were originally defined in Order 6000.5C, Facility, Service, and Equipment Profile, Appendix D "Special Use Facilities Master File Reporting Codes". Revision D of Order 6000.5 transferred these definitions to this order.

1-2. Audience. This order applies to all FAA employees and managers who directly or indirectly support NAS Infrastructure Facilities, including but not limited to: involved with implementation of power systems within the NAS; those who maintain and use FSEP; NAS program offices, and; National Airspace System Technical Evaluation Program evaluations.

1-3. Where Can I Find This Order? You can find this order on the Directives Management System (DMS) website, https://employees.faa.gov/tools_resources/orders_notices/, Or go to the MyFAA Employee Website, Select "Tools and Resources", and then select "Orders and Notices". This order may also be found on the Power Services Group, Orders, Standards, and Specifications webpage: https://my.faa.gov/org/linebusiness/ato/operations/facilities_engineering/power_services/sys_eng_team/stand_specs.

1-4. Cancellation. This order cancels Order 6950.2E, Electrical Power Policy Implementation at National Airspace System Facilities, dated October 10, 2019.

1-5. Explanation of Policy Changes. This order:

a. Reestablishes existing and adds new Power Source Codes. The codes defined and used in previous revisions of this order did not adequately serve to describe the various power equipment configurations within the NAS.

b. Establishes Power System Architectures, specific configurations of power distribution equipment for staffed and unstaffed infrastructure facilities.

c. Revises existing appendices and added new appendices.

d. Reformats the order to align with the requirements of Order 1320.1E, FAA Directives Management. Refer to Section 6-4, "Related Publications", for website, document information, and links.

Chapter 2. Roles and Responsibilities

2-1. Air Traffic Program Management Office and/or Integrated Product Teams. The Air Traffic Program Management Office and/or Integrated Product Team for NAS Air Traffic Control services and systems, i.e., Navigation, Surveillance, Communication, Weather, Automation, etc., will:

a. Identify the power requirements for their respective products. Power requirements include voltage, current, power, frequency, alternating/direct current, standby power, reliability/availability/maintainability (FAA-HDBK-006C, Reliability, Maintainability, and Availability [RMA] Handbook). Use of renewable and sustainable energy sources shall be considered, in accordance with JO 1053.3, Air Traffic Organization Energy Efficient and Sustainable New Construction and Major Renovation.

b. Identify and budget for power equipment at new infrastructure facilities.

c. Identify and budget for power equipment when power at existing infrastructure facilities does not meet the requirements for the particular NAS system or equipment.

2-2. Operations Engineering Support Groups. Operations Engineering Support Groups (AJW-C24/AJW-E24/AJW-W24) will:

a. In association with National Engineering Support Group (AJW-26), periodically review the performance of facility power systems and recommend changes consistent with operational requirements.

b. Determine whether the infrastructure facility power system at a particular facility is appropriate for the NAS Air Traffic Control equipment being installed. Use of renewable and sustainable energy sources shall be considered, in accordance with JO 1053.3, Air Traffic Organization Energy Efficient and Sustainable New Construction and Major Renovation.

2-3. Power Services Group. Power Services Group (AJW-22) will:

a. Issue technical standards and guidance to implement the power configurations necessary to meet requirements of this order and FAA Order JO 6030.20.

b. Identify and budget for sustained power support programs required by the latest version of FAA Acquisition Management System.

c. Establish power quality acceptance criteria for systems and equipment before connection to NAS Power Buses is allowed.

2-4. Planning and Requirements (P&R). Planning and Requirements (AJV-C/AJV-E/AJV-W) will:

a. Review facility power requirements against preapproved power equipment configuration shown in Appendix B.

b. If the proposed replacement is included in Appendix B, then proceed with Project Origination.

c. If the proposed replacement is not included in Appendix B, coordinate creation of NAS Change Proposal (NCP) documenting deficiencies and requesting alternative configuration. Section 5-9 provides guidance for special considerations.

Chapter 3. Implementation Guidance

3-1. Unstaffed Infrastructure Facilities. All federal and non-federal NAS equipment and facilities will be provided with power of a reliability and quality that is commensurate with (1) the equipment/facility mission requirements; and (2) the standards given within this order. Appendix B of this order lists the preapproved, usual, and prevailing power configurations for unstaffed infrastructure facilities, and NAS systems and equipment. These configurations have been determined by the various Air Traffic Program Management Offices / Integrated Product Teams and Engineering Services as configurations that will best meet the requirements for the majority of NAS systems and equipment. The listed power configuration is not to be understood as the "required" configuration. Other configurations are acceptable with approved NCP, provided they satisfy the operational requirements of the facility/equipment.

a. A change of power configuration in the published list does not in and of itself provide authority for changing the installed power system on an existing system.

b. Configurations of new facility installations will be in accordance with this order. Any other configuration requires an approved Local NCP with the Configuration Control Decision (CCD) recorded in the Facility Reference Data (FRD).

c. Existing facilities may retain their existing power configurations without an NCP, provided the existing power configuration is in conformance with prior standards, and meets the operational requirements of the facility. Power equipment replacement projects require an NCP with the CCD recorded in the FRD if replacement equipment is not in accordance with Appendix B.

d. Infrastructure facilities previously in accordance with Appendix B that no longer qualify because of reclassification, For example, a Very-High-Frequency Omnidirectional Range Tactical Air Navigation (VORTAC) that is now a Very-High-Frequency Omnidirectional Range/Distance Measuring Equipment, may keep what they have without an NCP until such time as all or a portion of the power equipment is at end of life. Power equipment replacement projects will require an NCP if replacement equipment is not in accordance with Appendix B.

e. Additional or replacement equipment that is form/fit/function equivalent to existing equipment at an existing facility does not make the facility a "new facility" needing to comply with Paragraph 3-1b.

f. Facilities with battery and engine generator standby power systems may keep what they have without an NCP until such time as all, or a portion of the power equipment is at end of life. At such time, the facility shall transition to the configuration of Appendix B, or obtain an approved NCP. Facilities do not qualify for both standby engine generator (SX) and battery standby power systems without an approved NCP. Battery backup power systems are not required to have a minimum of 4 hours of sustained operating capacity for facilities with battery and engine generator standby power systems.

g. Transition to new power configurations for existing facilities will be accomplished under the normal budgetary and Corporate Work Plan (CWP) processes. New power configurations are considered establishment projects, and are not generally covered under NAS Capital Investment Plan for Power Systems Sustained Support without management approval.

h. Exceptions to the listed configurations shall be separately justified in accordance with Order 1800.66, Configuration Management Policy, when a retention, establishment, modification, or improvement project is proposed.

i. Changes to the power system or the installation of new equipment require the accomplishment or update of load flow, voltage drops, short circuit analysis, arc flash, and protective device coordination studies in accordance with the latest revision of Order 6950.27, Power System Studies (Refer to Section 6-4, "Related Publications", for the website, document information, and links for this document). Such studies are part of the project scope and funded by the implementing organization.

3-2. Redundancy of Standby Power Sources. The two common methods of supplying long-time standby power to NAS facilities and equipment are engine generator (EG) standby power systems and battery standby power systems. An individual NAS facility or equipment may be provided with one or the other, but not both. EG systems are preferred for the following situations:

a. When the equipment load is fifteen (15) kilowatt / kilovolt-Amperes (kVA) and larger, and the desired backup time is greater than 12 hours,

b. When the power quality, including frequency of outages, is such that the batteries are not able to be fully recharged between outages,

c. When amp-hour nominal battery capacity is at least twelve (12) times the ampere rating of the battery charging equipment,

d. When the Heating, Ventilation, and Air conditioning (HVAC)/environmental needs of the facility cannot be met by a battery standby system. Battery life, for example, is reduced as battery temperature increases with non-operating HVAC.

3-3. Staffed Infrastructure Facility Power Architectures. Appendix D of this order identifies the normal-funded power architecture determined to meet the typical requirements for each NAS-staffed infrastructure facility, e.g., Air Route Traffic Control Center (ARTCC), Terminal Radar Approach Control (TRACON), Airport Traffic Control Tower (ATCT), at the time of construction. Subsequent changes in ATCT Level do not provide sufficient authority for changing the existing power system architecture. A Local NCP is necessary for changes to the power system architecture in accordance with the latest version of FAA Order 1800.66, and the approved CCD recorded in the FRD.

3-4. NAS Facility and Equipment Power Configurations. Appendix B of this order identifies the preapproved, usual, and prevailing, FAA-funded power configuration determined to meet the requirements for each NAS unstaffed infrastructure, and non-infrastructure system/subsystem/ equipment. Should a particular installation have operational and performance requirements mandating a power configuration different from the listed power configuration, the change of power configuration shall be requested through a Local NCP in accordance with the latest version of Order 1800.66, and the approved CCD recorded in the FRD. See Section 5-9 for special considerations.

3-5. Clarification for Remote Communication Facilities (RCF).

a. Existing Remote Communication Facilities.

(1) Existing RCFs, i.e., RTR, RCAG, ECS, and BUEC, that have a fully supportable and fit-for-service Standby EG (SX) are not required to replace their SX with a DCBUS or add a DCBUS. Per Paragraph 3.1.c, existing RCFs that have an existing SX can plan to replace the SX with an SX, or establish a DCBUS when the SX is at end of life or no longer fit for service. An NCP is required if the SX is to be replaced by an SX.

(2) RCFs that currently have a DCBUS system and an SX are not required to remove either so long as the systems are serviceable. When the time comes for power system replacement, either the DCBUS or the SX, but not both, will be replaced.

(3) Configurations of new facility installations will be in accordance with this order. An approved Local NCP documents any other configuration, with the CCD recorded in the FRD.

b. Gulf of Mexico. RCF sited on oil producing or pumping platforms in the Gulf of Mexico are provided power by the host platform. Space on these platforms is extremely limited and it may be impossible or economically infeasible to secure enough space for supporting FAA power equipment. RCF using platform-provided standby power are to use, without NCP, PSC 6 (standby power provided by other than FAA) in place of PSC D or other listed configuration. A mini-uninterruptible power supply (mini-UPS) may, without NCP, be incorporated in this configuration.

3-6. Alaskan Region Electrical Power Policy. NAS facilities in Alaska experience various levels of unreliability of commercial power. Reliance on air transportation for facility access and the extreme weather conditions creates unique situations that are not specifically addressed in the national policy orders. Order AL 6030.19B, Alaskan Region Electrical Power Policy Criteria, applies to all existing and planned facilities within the Alaska region and provides for site adaptation. This order does not require an NCP for Alaska facilities that are in accordance with this order, or AL 6030.19B.

3-7. Central Control Monitoring Systems (CCMS). CCMS workstation and display units are preapproved, as are direct digital controller (DDC) processors. CCMS printers and DDC processors that are not field controllers (FC) are not preapproved to be on the critical/facility UPS bus. DDC processors that are not FC are permitted only when a separation of the DDC from the non-FC is not feasible. Preapproved devices must meet the following conditions:

a. A momentary loss of power results in an outage of more than one piece of equipment;

b. The system or subsystem load is 5A or less, and;

c. The power supply is IEC 61000-3-2 certified--Electromagnetic Compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤16 A per phase), or has been successfully tested in accordance with the latest revision of FAA Specification FAA-G-2100, Electronic Equipment, General Requirements.

Chapter 4. Power Source Code Guidance

4-1. Power Source Codes. PSCs are used in FSEP to describe the basic power configuration in place supporting NAS infrastructure facilities, systems, and equipment. Standby power and power conditioning equipment are FAA-provided, except for PSC 6. The Power Source Codes listed in this order are defined below:

Table 4-1. Power Source Code Definitions

PSC	Description of Power Configuration
1	Commercial power source and standby engine generator(s).
4	Single source of commercial power.
6	Standby power system provided by other than FAA, e.g., military, airport authority, oil platform.
8	Dual, independent sources of commercial power.
A	Commercial power source, standby engine generator, and PCS, usually a Facility UPS with energy storage less than four hours. This configuration provides conditioned, uninterruptible, and long-time engine generator standby power primarily for ac-voltage powered equipment.
B	Commercial power source, standby engine generator, and Mini-UPS. This configuration provides conditioned, uninterruptible, and long-time engine generator standby power primarily for ac-voltage powered equipment.
D	Commercial power source, battery standby power system, with or without a dc-to-ac inverter. A UPS with less than four (4) hours battery operating time is not included in this category. Configurations without a dc-to-ac inverter provide conditioned, uninterruptible, and long-time standby power primarily for dc-voltage powered equipment. Configurations with a dc-to-ac inverter can provide conditioned, uninterruptible, and long-time battery standby power primarily for ac-voltage powered equipment.
E	Commercial power source, battery standby power system, with or without a dc-to-ac inverter (PSC D) + standby engine generator. Used by special permission.
F	Commercial power source, battery standby power system coupled with a fuel cell for extended operation, with or without a dc-to-ac inverter. Configurations without a dc-to-ac inverter provide conditioned, uninterruptible, and long-time standby power primarily for dc-voltage powered equipment. Configurations with a dc-to-ac inverter can provide conditioned, uninterruptible, and long-time battery standby power primarily for ac-voltage powered equipment.
H	Commercial power source and a Facility UPS or Mini-UPS / MUPS.
S	Used by NAS equipment to indicate the power configuration is that of the infrastructure facility. This code replaces the “same as host facility” note.
V	Renewable energy source such as photovoltaic or wind turbine with a battery system. Standby commercial power is optional.
W	When the facility is itself an FAA power source or equipment; e.g., CPDS, ACEPS, DCBUS, Primary Power Engine Generator (PX), Mobile Engine Generator (MX), PCS, UPS, Clean Energy (CLEAN), ELD, etc., Refer to Appendix A, Definitions and Acronyms, as necessary.
X	Used when the facility has no source or requirement for power; e.g., passive reflectors, trails, roads, etc.
Z	Single source of prime power continuously generated by an independent generating device; e.g., prime power engine generator, thermoelectric, nuclear, fuel cell, etc.

4-2. Power System Architectures. PSC do not distinguish the various architectures available for NAS systems. The PSC describes the components of the power equipment involved, but not the design configuration. The Power System Architecture (PSA) describes design configuration, how these components are put together, such as ARTCC Critical and Essential Power System (ACEPS), Critical Power Distribution System (CPDS), or simple radial system. The tables of Appendix C of this order list these various architectures, and the power buses supported.

4-3. Source of Power Requirements.

a. The power configurations listed in this order are based upon:

(1) NAS Requirements Documents.

(2) Air Traffic Program Management Office and/or Integrated Product Team.

(3) Engineering Services (AJW-2C/AJW-2E/AJW-2W).

(4) Power Services Group (AJW-22).

b. This order does not independently dictate a particular architecture to the exclusion of any other.

c. This document is not the source of power configuration requirements.

4-4. Continuous Power Airport. For an airport identified as a Continuous Power Airport (CPA), as defined in Order JO 6030.20, only the facilities associated with the operation of the one designated CPA runway shall be permitted to be configured with CPA facility power service levels indicated in Appendix B of this order.

4-5. Instrument Flight Rules (IFR) Category (Cat) II/III.

a. Air Traffic operations under IFR Cat II and IFR Cat III conditions require approach lighting systems to transfer to alternate power within 1 second of power failure. The 1-second transfer time can be obtained in different ways, including powering the facility with the engine generator during the Cat II/III conditions and using commercial power as the standby source. In this mode, the facility load automatically transfers back to commercial power within the required 1 second transfer time should the engine fail.

b. Operating the engine generator in other than emergency conditions (such as low-visibility landing conditions, per ICAO) requires permitting in accordance with federal/state/local environmental regulations.

c. There are no specific requirements regarding the composition of this alternate power source, such as use of an engine-generator power, or alternate commercial power feed. Alternate configurations need approval through the normal Configuration Management process.

4-6. Alternate Power Configurations. Appendix B of this order indicates the preapproved, usual, and prevailing power service for each facility type. In some instances, an alternate configuration may satisfy facility requirements more cost effectively. Requests for the following alternate configurations shall be through the NCP process:

a. Use Power Source Code V in place of Codes 4, 1, and D where reliability and life cycle cost considerations are favorable compared with engine generator systems or the installation and costs of primary commercial power. Battery reserve power for these systems should be sized for

a minimum of 4 hours service based on the worst case environmental conditions for the particular facility location.

b. Use Power Source Code Z in place of Code 4 where reliability and life cycle cost considerations are favorable compared with the installation and costs of primary commercial power.

c. Use Power Source Code D in lieu of Code 1 when equipment changes allow the facility's operational requirements to be satisfied by a battery standby power system.

Chapter 5. Technical Guidance

5-1. Electrical Power to NAS Equipment.

a. The quality of the electrical power provided to a facility shall be of acceptable reliability and availability as required by the equipment. The performance characteristic requirements of the facility load ultimately dictates the necessary voltage and frequency, standards and tolerances required by each individual power system.

b. The ultimate and primary goal of any power system is to provide an acceptable level of power to the NAS equipment loads to ensure the safe separation of air traffic. Standby power sources such as FAA Engine Generators and FAA UPSs will supply satisfactory power. Consult with Power Services Group as needed for corrective actions.

5-2. Specific Requirements for Various Power Services.

a. Engine Generator Standby Power Systems.

(1) Facilities that use one or more engine generators as a standby power system shall start at least one standby engine generator (SX) and begin providing standby power within 15 seconds of a failure of the prime power source, and within 10 seconds for an SX used to support fire life safety (FLS) circuits. The SX shall be capable of sustained operation for a minimum of 72 hours.

(a) Typically, a sufficient fuel supply shall be maintained in the storage system for the minimum required operating time. A reduced fuel supply may be maintained at locations where fuel is readily available and delivery agreements are in place; e.g., major airports and where fuel volume is continuously monitored. At facilities with difficult access, fuel supplies shall be determined on a site-by-site basis. In all cases, actual engine generator loadings are the basis for fuel supplies, not on maximum engine fuel consumption rates.

(b) Facilities with pipeline fed standby engine generators do not require stored fuel supplies, with the exception of facilities located in areas subject to pipeline failures. Pipeline-fed fuel sources are subject to pipeline failure since valves and other flow control devices are outside the operational control of FAA personnel and may be replaced with dedicated on site fuel source when determined necessary. At these locations, fuel supplies shall be established on a site-by-site basis.

(2) Install closed transition switching, switching with no interruption, where justified by operational requirements, after coordination with Power Services Group – Systems Engineering, and the electric utility.

(3) Closed transition switching at facilities with a facility UPS are generally not allowed.

b. Battery Standby Power Systems.

(1) Power systems incorporating batteries provide conditioned, uninterruptible and standby power to facilities where the NAS equipment primarily uses direct current for proper operation. Alternating current may be available for powering equipment. These systems shall provide such power immediately (without interruption) upon failure of the prime power source and shall be capable of sustained operation for a minimum of four (4) hours at the lowest normal

operating temperature of the facility, usually the inside ambient temperature. Systems incorporating renewable sources, e.g. fuel cells, photovoltaic, and the like, are not required to have the minimum 4-hour battery reserve because the alternative power source batteries in this case are not needed solely to provide the extended standby power.

(2) Battery standby power systems must be sized to provide sustained operation for a minimum of four (4) hours. The 4-hour minimum operating time may be increased for locations in remote areas and for facilities where redundant services are not available.

(3) Battery Standby Power systems should be sized to accommodate the NAS operational loads and only infrastructure loads absolutely necessary for NAS equipment operation. The operational parameters for the facility-specific electronic NAS equipment shall dictate the associated infrastructure loads. If an HVAC is determined to be absolutely necessary for NAS equipment operation at a facility that has no engine generator standby power system, an approved NCP is required before the HVAC load can be added to the battery standby power system.

(4) A permanently wired means of connection with an appropriate transfer switch may be provided where proven numerous power outages occur, to permit a safe and accurate means to connect and disconnect a MX to the facility's electrical system to permit recharge of the batteries in the event of a prolonged prime power outage, the duration of which is longer than the installed backup time. This connection is particularly recommended where the amp-hour nominal battery capacity is at least twelve (12) times the ampere rating of the battery charging equipment.

(5) The battery system outputs shall be in multiples of 12 volts (e.g., 12, 24, 36, 48 volts) and shall be sized for the systems served.

(6) Battery charging systems shall be sized to fully recharge a depleted battery within 12 hours.

c. Site-Generated Power Systems. Site generated power systems, that is, prime power generated by a photovoltaic or wind generator with a battery system, FAA-prime power engine generator plant at the facility site or remote from it, and prime power generated by an independent device such as thermoelectric, nuclear, fuel cell, non-rechargeable battery, etc., shall be established to provide continuous power without required on-site maintenance activity more frequent than the normal facility preventive maintenance schedule.

d. Dual-Source Utility Power. Facilities which utilize a source consisting of two (or more) commercial/utility power feeds and having no other standby power shall provide transfer from feed to feed within a maximum of 15 seconds.

e. Agency owned PX. Agency owned PX power systems shall only be utilized where no other source of power is available or where the expense of other sources of power would exceed that of establishing and operating such a system. The system shall consist of at least one engine generator, the number of EGs shall be based on the criticality of the site, specifically designed for continuous operations. It shall have either automatic transfer switches designed in accordance with agency standards or 24-hour attendance.

5-3. Co-Located Facilities. Where system/equipment or subsidiary components are co-located at a facility or shelter and different power configurations are indicated by Appendix B of this order, or where the PSC is listed as “S” or where "same as host facility" appears, the following criteria shall be used, provided that power quality, capacity, and availability are not degraded:

a. At facilities where engine generator standby power is available for NAS services, NAS systems, equipment, and support components may be connected to the engine generator, provided the existing SX can handle the additional loads, and configured as PSC 1 or A.

b. At facilities where battery standby power is available for NAS services, NAS systems, equipment, and support components may be connected to the existing battery system, provided the existing battery system that has requirements for standby power may be reconfigured to utilize the battery standby power, and configured as PSC D.

5-4. Power Conditioning Devices.

a. Power conditioning devices are considered equipment loads, and the requirements of Section 5-7 apply. The Program Office requesting the power conditioning device is responsible for associated costs and activities.

b. Power conditioning devices not addressed by the PSC or PSA codes in Appendix C of this order may be required at some facilities to provide a stable regulated power source. Installing a power conditioning device, including a UPS or mini-UPS/MUPS, on a power conditioned bus (e.g., critical bus) is not recommended.

c. Where facility configuration and equipment type make it possible, the PCS/MUPS should be a dual-corded and dual-redundant power supply. Each power supply shall be capable of handling the full load. All electronic equipment shall be tested per FAA-G-2100. The power test report shall be included in an NCP for review along with justification of the PCS and/or MUPS.

d. For NAS systems with power conditioning installed on critical bus UPS, the following shall apply:

(1) Existing power conditioning devices that are part of a previously installed system supporting critical NAS systems can remain on the facility critical bus UPS.

(2) During modernization projects, any unnecessary power-conditioning device shall be eliminated, and the sponsoring program office shall revise the configuration control drawings. Leaving the UPS installed during modernization efforts will require an approved NCP.

(3) New system installation projects will require an approved NCP to install power-conditioning devices on the facility critical bus UPS. The ACEPS FAA Telecommunications Infrastructure (FTI) system is exempted from this requirement.

e. Criteria for Power Conditioning Devices. The following criteria are used to evaluate the need for installing a power conditioning device:

(1) Power conditioning equipment may be provided for NAS electronic equipment and systems that fall into one or more of the following categories:

(a) The NAS system/equipment is designated as Safety-Critical or Efficiency-Critical and is listed in the NAS Configuration Management Document, NAS-MD-001, NAS Master Configuration Index Subsystem Baseline Configuration and Documentation Listing.

(b) The NAS system/equipment is subject to power outages or transients in excess of a few milliseconds, which cause equipment operation to cease, or cause other equipment or subsystems to cease operations for 30 seconds or more.

(c) The NAS system/equipment is subject to frequent or intermittent power fluctuations of short duration, which significantly jeopardize the successful accomplishment of the FAA mission related services.

(d) The NAS system/equipment is vulnerable to damage or misalignment because of transients and short duration power outages.

(2) Prior to the installation of a power conditioning device to support specific loads in an existing facility, the following shall be obtained:

(a) An analysis of the existing electronic equipment load characteristics to establish power consumption, current harmonics, inrush current profile, power factor, etc.

(b) An analysis to insure compatibility between the equipment load analysis obtained and the proposed power conditioning device.

(c) An analysis of the impact of the proposed power conditioning device on its source and the rest of the facility; e.g., voltage regulation, harmonic distortion, inrush currents and transient generation, resulting from powering the equipment load. This analysis shall be conducted in accordance with the latest version of Order JO 6950.27, Power System Studies. (Refer to Section 6-4, "Related Publications", for website, document information, and links).

(d) An analysis of the potential to introduce or worsen a "single point of failure" and the subsequent impact to the NAS.

5-5. Remote Monitoring. Facilities with standby power systems capable of remote monitoring should monitor the status of commercial power and standby power systems. Reference Orders 6000.15, General Maintenance Handbook for National Airspace System (NAS) Facilities, and Order 6000.30, National Airspace System Maintenance Policy. The facility system support center (SSC) is the benefiting organization and is responsible for associated costs and activities.

5-6. Non-FAA Power Systems. FAA-facility standby power systems, which are owned and operated by a non-FAA authority, must meet the requirements of this order. Such systems are recorded in FSEP as PSC 6.

5-7. Connecting Equipment to NAS Power Systems. Before connecting any equipment to any FAA power bus/system, the following criteria must be satisfied. The organization proposing the equipment is responsible for associated costs and activities.

a. The equipment shall be operated and maintained in accordance with established FAA practices. For leased equipment that will be operated or maintained by a contractor, the contract shall require the equipment to be operated and maintained in accordance with FAA practices. Maintenance records and equipment shall be available at each leased equipment location for review and technical evaluation by designated FAA personnel. Equipment shall be tested until the FAA is assured it is compatible with the system from which it will be powered. Testing shall not be performed on a Critical or Essential power bus. All testing shall be completed and approved prior to the equipment being connected in an operational environment. At no time shall any equipment be connected to an existing facility's power system if it adversely affects the operation or performance of other equipment.

b. The power required by the equipment must be analyzed to ensure that the facility power system does not become overloaded or unbalanced.

c. Peak inrush current of electronic equipment must not exceed the limits specified in FAA-G-2100. All other loads must have a peak inrush current characteristic that will not cause power anomalies detrimental to the facility operation, nuisance over-current device operation, or operational problems with the source.

d. Power factor of nonlinear loads, such as electronic equipment and variable frequency drives (VFD), must not exceed the limits specified in FAA-G-2100. For all other loads, the power factor measured at the service entrance shall be within 0.8 lagging to 1.0 or as required by the local utility contract. Power factor at the engine generator output shall be 0.8 lagging to 1.0. Power factor at all other locations shall be considered with regard to energy conservation and performance of power sources and power conditioners. The total power factor is the product of the displacement power factor and the distortion power factor, PF = (PF_{disp}) * (PF_{dist}). Equipment installed at facilities that have a pre-existing leading power factor shall not cause the facility to have greater leading power and a lower leading power factor.

e. The impact to the power bus from the current total harmonic distortion (THD) of each equipment/system and environmental equipment/system (such as air conditioners, lighting, UPS, VFDs, etc.) shall be considered when connecting equipment to a power bus. The current THD of electronic equipment shall not exceed the limits specified in FAA-G-2100. Equipment listed under International Electrotechnical Commission IEC 61000-3-2, Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤16 A per phase), or IEC 61000-3-4, Electromagnetic compatibility (EMC) – Part 3-4: Limits – Limitation of emissions of harmonic currents in low-voltage power supply systems for equipment with rated current greater than 16 A, is deemed in compliance with the current harmonic distortion requirements of this order.

5-8. Maintenance Bypass Switch. Maintenance Bypass Switches (MBS) around transfer switches are permitted – without NCP – for Airport Surveillance Radar (ASR) at Level 10 and higher airports so equipped and where national configuration drawings allow. Installations for other facilities will require an approved NCP. A Level 10 or higher MBS-equipped airport that subsequently is reclassified to Level 9 or lower is not required to remove the MBS or file NCP to retain the MBS. A Level 9 or lower airport that is subsequently reclassified to Level 10 or higher is not required to install a MBS.

5-9. Special Considerations. At some facilities, special situations may dictate a power configuration different from that described in Section 3-1 and assigned in Appendix B. Some of the special situations are discussed below:

a. Meteorological. A facility located in an area with a history of electrical, ice, or wind storms, which have caused abnormally frequent prime power disruptions and/or excessively long outages, may qualify for a higher grade power configuration if such disruptions cannot be tolerated.

b. Accessibility. A facility located in a remote area where a prime power outage is likely to be of a duration incompatible with operating requirements, and could result in excessive exposure of maintenance personnel to hazards, may qualify for a higher grade power configuration.

c. Defense Readiness. In some cases, the requirement to maintain an effective defense readiness posture differs from the normal operational requirement.

d. Military Requirements. A higher grade power configuration may be necessary due to specific military requirements.

e. Power Quality. A facility located in an area of poor utility power quality that would adversely affect facility operation.

f. Business Decision. Economic/operational considerations may dictate a specific power system type.

Chapter 6. Administrative Information

6-1. Distribution. This order will be distributed electronically.

6-2. Background.

a. FSEP lists facilities, systems, and equipment, and the distinction is not always clear or maintained. Systems and equipment work together to provide a NAS service such as Automation, Communication, Navigation, Surveillance, or Weather. Facilities are the infrastructure supporting the NAS systems and equipment. An airport traffic control tower (ATCT) is easily judged to be a facility. En Route and Terminal Facilities are generally clear. Confusion becomes more apparent when Unstaffed Infrastructure Facilities are concerned; as such, a facility may host multiple services, yet be known by only one name. A very high frequency omnidirectional range (VOR) Facility likely houses a VOR system, but may also house another system such as Distance Measuring Equipment (DME). If the power bus supplied by the VOR facility configuration is satisfactory for the DME, then all is well.

b. Confusion may also arise when a particular facility architecture supplies multiple power buses. The very name ACEPS, for example, is Air Route Traffic Control Center (ARTCC) Critical and Essential Power System. It is correct that an ARTCC has an ACEPS. There may be systems and equipment located in an ARTCC that require critical power, and equipment that does not require critical power. Thus, there needs to be a code defining the appropriate power bus, independent of the actual architecture used to obtain that bus. Power Services Group took a subset of the Power Source Codes in an attempt to define power bus performance, keeping the original code, and but using the major component definitions instead of performance. Eventually, the PSC definitions were transferred to this order, and many of the original codes were no longer valid.

c. It is possible that a Facility, such as a storage shed, is listed in FSEP but has no power requirement. It is therefore necessary to include a code for this “null” topology. A blank entry may be misunderstood to mean that no power topology has been entered in the record.

d. NAS Services are categorized by the capability and impact to the NAS. NAS Services are composed of various Systems/Subsystems/Equipment, each having certain power requirements. However, these power requirements are not explicitly addressed by current power service and bus definitions. Some of these requirements are more obvious, such as voltage and frequency. Other requirements are not as obvious, such as reliability, maintainability, availability. Consider a power system at a facility that has a daily power outage lasting one (1) second. If the NAS equipment is instantly operational after power restoration, then the system availability is approximately 0.999988. On the other hand, if the NAS equipment has a 30-minute restoration – the value assumed for most systems, the system availability drops to an unacceptable level of 0.97958. The power system itself is the same for both installations. The difference in availability is based upon the performance of the NAS equipment, not the power to that equipment. NAS service/system power requirements do not derive from Power Services Group, but from the program office for that NAS service/system.

6-3. Authority to Change Appendix.

a. Appendix B of this order lists the preapproved, usual, and prevailing power configurations for unstaffed infrastructure facilities, NAS systems, and equipment at the time of order publication. As new systems are introduced into the NAS, or new power requirements are determined by the appropriate Air Traffic Program Management Office and/or Integrated Product Teams, Appendix B will be updated by Power Services Group, Systems Engineering, to include the new system and appropriate power configuration.

b. Changes to Appendix B are under Configuration Management. For convenience, Appendix B will be maintained electronically and made available on the FAA Intranet, Power Services Group, Systems Engineering, Orders, Standards and Specifications website. Refer to https://my.faa.gov/org/linebusiness/ato/operations/facilities_engineering/power_services/sys_eng_team/stand_specs. Personnel responsible for maintaining a technical order library are authorized to print new versions from the PSG website and insert them as desired.

6-4. Related Publications. The latest editions of the following publications are the references for implementation of electrical power policy:

a. FAA Order 1320.1E, FAA Directives Management. This order prescribes the FAA Directives System as the means for issuing policy and procedures within the FAA. Refer to https://employees.faa.gov/tools_resources/orders_notices/index.cfm/go/document.information/documentID/14958.

b. FAA Order 1800.66A, Configuration Management Policy. Refer to https://employees.faa.gov/tools_resources/orders_notices/index.cfm/go/document.information/documentID/1034069. Also contains information for NAS-MD-001, NAS Configuration Management Document ("NAS Master Configuration Index Subsystem Baseline Configuration and Documentation Listing"), which documents "Master Configuration Index (MCI)" content.

c. FAA Order 6000.5F, Facility, Service, and Equipment Profile (FSEP). This order sets forth policy, roles and responsibilities for the maintenance of FSEP. Refer to https://employees.faa.gov/tools_resources/orders_notices/index.cfm/go/document.information/documentID/1040986.

d. FAA Order JO 6030.20, Electrical Power Policy. Refer to https://my.faa.gov/sites/my.faa.gov/files/2024-03/JO_6030_20G_with_CHG_1_Electrical%20Power%20Policy.pdf.

e. FAA Order JO 6950.27, Power System Studies. Refer to https://my.faa.gov/sites/my.faa.gov/files/org/linebusiness/ato/operations/technical_operations/atc_facilities/power_services/sys_eng_team/stand_specs/media/orders/JO_6950_27B.pdf.

f. FAA Specification FAA-G-2100, Electronic Equipment, General Requirements. Refer to Orders, Standards and Specifications.

g. FAA Specification FAA-E-99001, Photovoltaic Specification. Refer to https://my.faa.gov/sites/my.faa.gov/files/2023-12/FAA-E-99001%20-%20Photovoltaic%20Specification.pdf.

h. JO 1053.3, Air Traffic Organization Energy Efficient and Sustainable New Construction and Major Renovation. Refer to https://employees.faa.gov/tools_resources/orders_notices/index.cfm/go/document.information/documentID/1020212.

Appendix A. Definitions and Acronyms

The following table contains definitions for the acronyms and key terms presented within this document.

> **Note**: See Table B-1 for acronyms associated with NAS facility and equipment power configurations.

Table A-1. Definitions and Acronyms

Acronym	Definition
ac	Alternating Current
ACEPS	Air Route Traffic Control Center (ARTCC) Critical/Essential Power System
ALS	Approach Lighting System
ARTCC	Air Route Traffic Control Center
ASR	Airport Surveillance Radar
ATCT	Airport Traffic Control Tower
ATO	Air Traffic Organization
BUEC	Backup Emergency Communication System
CAT	Category (ICAO Landing Conditions)
CCD	Configuration Control Decision
CCMS	Central Control Monitoring System
CLEAN	Facility Clean Energy System
CPA	Continuous Power Airport
CPDS	Critical Power Distribution System. CPDS is an umbrella system consisting of a number of different architectures such as Dual Redundant Power Distribution System (DRPDS), Critical Redundant Power Distribution System (CRPDS), ACEPS, and various power systems configurations.
CWP	Corporate Work Plan
dc	Direct Current
DCBUS	Direct current battery standby power system, or direct current backup system. Also referred to as DC BUS. DC BUS systems often support communication facilities through distribution equipment providing power to the many radios and other associated loads, but are also found in other smaller applications.
DCN	Document Change Notice
DDC	Direct Digital Controller
DME	Distance Measuring Equipment
DMS	Directives Management System
DRPDS	Dual Redundant Power Distribution System
ECS	Emergency Communication System
EG	Engine Generator
ELD	Electrical Line Distribution
EMC	Electromagnetic Compatibility

Acronym	Definition
FAA	Federal Aviation Administration
Facility UPS	See Uninterruptible Power Supply (UPS)
FC	Field Controller
FLS	Fire Life Safety
FRD	Facility Reference Data
FSEP	Facility, Service, and Equipment Profile
FTI	FAA Telecommunications Infrastructure
HDBK	Handbook
Host Facility	NAS Infrastructure System established to provide environmental support for NAS non-Infrastructure system or systems. Unstaffed Host Facilities generally support one principal NAS system, although other systems may be collocated at the pleasure of the FAA. Staffed host facilities are typically Terminal and En Route ATCT, TRACON, ARTCC, and similar facilities, generally supporting a conglomeration of NAS systems and equipment for Air Traffic Control.
HVAC	Heating, Ventilation, and Air Conditioning
ICAO	International Civil Aviation Organization
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IFR	Instrument Flight Rules
Infrastructure Systems	The physical facilities that house, protect, and support NAS communications, navigation, surveillance, weather, and other air traffic control equipment. Infrastructure Systems include electrical power generation, transmission, and distribution equipment such as Uninterruptible Power Supplies (identified in FSEP as PCS), Engine-Generators (PX, SX, MX), Tanks, Direct Current Backup Systems (DCBUS), Battery Systems, Electrical Line Distribution (ELD) power cables; Lightning Protection, Grounding, Bonding, and Shielding (LPGBS) systems, and physical structures. Equipment providing a NAS Mission Service of communications, navigation, surveillance, weather, or other air traffic control services is not infrastructure for purposes of this order.
LPA	Linear Power Amplifier
LPGBS	Lightning Protection, Grounding, Bonding, and Shielding
LRR	Long-Range Radar
MALS	Medium Intensity ALS
MBS	Maintenance Bypass Switch
MCI	Master Configuration Index
MX	Mobile Engine Generator
NAS	National Airspace System
NCP	NAS Change Proposal
NFPA	National Fire Protection Association
PF	Power Factor
PF_{disp}	Displacement Power Factor

Acronym	Definition
PF_{dist}	Distortion Power Factor
PCS	Power Conditioning System. Equipment and/or system designed to buffer the sensitive load from various disturbances of the power source. PCS includes surge suppressors, filters, isolation transformers, low-voltage line reactors, voltage regulators, motor generators, and uninterruptible power supplies (UPS).
P&R	Planning and Requirements (organization)
PSA	Power System Architecture
PSC	Power Source Code
Premises Wiring	Interior and exterior wiring, including power lighting, control, and signal wiring together with all their associated hardware, fittings, and wiring devices both permanently and temporarily installed. This includes wiring from the service point or power source (including the power source if there is no service point) to the outlets (NFPA 70, National Electrical Code).
Primary Power	That source of supply of electric energy utilized by the user which is normally available continuously day and night, usually supplied by an electrical utility company but sometimes by the owner generation (IEEE Std 100 Seventh Edition). Within the FAA, engine generators providing prime power are designated as PX.
PX	Primary Power Engine Generator
RCAG	Remote Center Air/Ground Communications Facility
RCF	Remote Communication Facility
RTR	Remote Transmitter/Receiver
S	Same as Host
Service Equipment	The necessary equipment, usually consisting of a circuit breaker(s) or switch(es) and fuse(s) and their accessories, connected to the load end of service conductors to a building or other structure, or to an otherwise designated area, and intended to constitute the main control and cutoff of the supply (NEC NFPA 70).
Service Point	The point of connection between the facilities of the serving utility and the premises wiring. This point is the main control and cutoff of the supply (NFPA 70, NEC).
Service Delivery Point (SDP)	The customer which receives and benefits from the service provided.
SSC	System Support Center
Standby Power	The power supply that is selected to furnish electric energy when the preferred power supply is not available (IEEE Std 100-1977). Implied in this definition is power for an extended time, 4 hours or more. Within the FAA, there are two types of standby power sources: (1) Engine Generator, designated SX; and (2) Battery. Engine generator standby systems may include a UPS. Inclusion of batteries as part of a UPS is not the same as a Battery standby power system, where batteries are the only source of standby power.

Acronym	Definition
SWIM	System Wide Information Management
SX	Standby Engine Generator
TDDS	Terminal Data Distribution System
THD	Total Harmonic Distortion
TRACON	Terminal Radar Approach Control
Uninterruptible Power Supply (UPS)	A system designed to provide short-time power automatically, without delay or transients, during any period when the normal power supply is incapable of performing acceptably and long-time standby power is not yet available. Notes: (a) A UPS is a type of PCS, but not all PCS are UPS. (b) Facility UPS systems are usually larger systems designed to support an entire facility or major portion, such as an information processing room. (c) Mini-UPS/MUPS systems are usually smaller systems, designed to support a single piece of equipment or rack of equipment. These systems are often 10 kVA or smaller.
VFD	Variable Frequency Drive
VOR	Very-High-Frequency Omnidirectional Range
VORTAC	Very-High-Frequency Omnidirectional Range Tactical Air Navigation

Appendix B. Preapproved NAS Facility and Equipment Power Configurations

The power configurations listed in this table are the preapproved, usual, and prevailing FAA-funded power configurations for the listed NAS systems. They are not to be understood as the "required" configuration. Equipment located within a Staffed Infrastructure Facility is authorized Power Source Code S, connected to the available power at that facility.

> **Note**: The Power Services Group System Engineering webpage also hosts a version of the Appendix B table as "6950.2F Appendix B: Facility Power Source Codes". This table contains some information reflecting operational events and may be more current than the table provided in Appendix B of this document.

See Table 4-1 in Chapter 4 for definitions of power source codes.

Table B-1. Preapproved NAS Facility and Equipment Power Configurations

FACILITY TYPE	DESCRIPTION	POWER SOURCE CODE (See Section 4-1)	COMMENTS
ADAS	AWOS Data Acquisition System	S	Available power at infrastructure host facility
ADM	Administration Building	4	
AEFS	Advanced Electronic Flight Strips	A	Where available
AFSAS	Alaskan Flight Service Automation System	S	Available power at infrastructure host facility
AFSS	Automated Flight Service Station	A 1	Automation Equipment = A All other equipment = 1
ALS	Approach Lighting System	CAT I = 4 CAT II/III = 1 CPA = 1	CAT II/III requires 1 sec. transfer.
ANICS	Alaska Interfacility Communication System	A	
ARMS	Airport Remote Monitoring System	D	
ARSR	Air Route Surveillance Radar	1	
ARTCC	Air Route Traffic Control Center		See Appendix D, Table 4, Facility Power System Topology and Facility Type
ARTS-II, -IIA	Automated Radar Terminal System	1	
ARTS-III	Automated Radar Terminal System	A	
ASDE-3	Airport Surface Detection Equipment	A	Includes Antenna

FACILITY TYPE	DESCRIPTION	POWER SOURCE CODE (See Section 4-1)	COMMENTS
ASDE-X	Airport Surface Detection Equipment	A	These systems are assigned power configurations of Power Source Code A subject to the limitation that the load of this system does not affect other loads supporting Air Traffic Critical Services. This system will be considered for removal from the Facility UPS at any site where the combined capacity exceeds 80% of the UPS rating.
ASI	Altimeter Setting Indicator	S	Available power at infrastructure host facility
ASOS	Automated Surface Observation System	4	
ASR	Airport Surveillance Radar	A	
ASR9 ICSR	ASR9 Intermediate Communications Sub Rack	S	
ASSC	Airport Surface Surveillance Capability System	A 1 4	Where equipment is available Where equipment is available Where equipment is available
ASTI	Alaskan Satellite Telecommunications Infrastructure	A	
ATBM	Airway/Terminal Building Maintenance	4	
ATCBI	Air Traffic Control Beacon Interrogator	1	
ATCBI-6	Air Traffic Control Beacon Interrogator	A	
ATCRB	Air Traffic Control Radar Beacon	1	
ATCT	Airport Traffic Control Tower		See Appendix D, Table 4, Facility Power System Topology and Facility Type
ATIS	Automated Terminal Information System	S	Available power at infrastructure host facility
ATOP	Advanced Technologies and Ocean Procedures	S	Available power at infrastructure host facility
AWANS	Aviation Weather and NOTAM System	4	
AWIS	Airport Weather and Information System	S	Available power at infrastructure host facility
AWOS	Automated Weather Observation System	4	
BDIS - Class A	Automatic Interchange Service B - Solid State	A	
BLDG	Building	4	

FACILITY TYPE	DESCRIPTION	POWER SOURCE CODE (See Section 4-1)	COMMENTS
BUEC	Back-Up Emergency Communications	S	Sites with PSC 1 = 1 Sites with PSC D and a compatible external battery source = D All other sites = 4
BWM	Bandwidth Manager	S	Available power at infrastructure host facility
CCMS/ DDC	Central Control Monitoring System/ Direct Digital Controllers	A	CPU only. Field controllers (FC) = A DDC processors that are not FC are permitted only when a separation of the DDC from the non-FC is not feasible. See Section 3-7 for details.
CCTV	Closed Circuit TV	4	
CD	Common Digitizer	A	
CERAP	Combined Center / Rapcon	1	
CFCC	Central Flow Control Computer	A	
CHILR	Chiller System	S	Not Critical Power
CLEAN	Clean Energy	W	
CLM	Control Line Maintenance	S	Available power at infrastructure host facility
CMLT	Communications Microwave Link Terminal	1	
COMCO	Command Communications Outlet	1	
CONUS / NORAD	Radio	A	
CPDS	Critical Power Distribution System	W	
CSAP	Combined Services Access Point	S	Available power at infrastructure host facility
CSSWX	Common Support Services/Weather	A S	At ARTCCs and TRACONs where available; Available power at infrastructure host facility
CTRB	Center Building Maintenance	4	
DASI	Digital Altimeter Setting Indicator	S	Available power at infrastructure host facility
DCBUS	DC Bus System	W	
DIO	Discrete Input/Output	S	Available power at infrastructure host facility
DME	Distance Measuring Equipment	D	
DME	Distance Measuring Equipment	4	DME has local battery standby power

FACILITY TYPE	DESCRIPTION	POWER SOURCE CODE (See Section 4-1)	COMMENTS
DMER	Distance Measuring Equipment Remaining	4	DMER has local battery standby power
DMUX	Data Multiplex	S	Available power at infrastructure host facility
DOTS	Dynamic Ocean Tracking System	S	Available power at infrastructure host facility
DSP	Departure Spacing Program	A	
DSR	Display System Replacement	S	Available power at infrastructure host facility
DVRS	Digital Voice Recording System	S	Available power at infrastructure host facility
EAS	En Route Automation System	S	Available power at infrastructure host facility
ECG	En Route Communications Gateway	S	Available power at infrastructure host facility
ECS	Emergency Communications System	D	
EDDS	En Route Data Distribution System	S	
ELD	Electrical Distribution System	W	
ELVTR	Elevator	S	Not Critical Power
EOF	Emergency Operation Facility	1	
EPMS	Electrical Power Monitoring System	S	Available power at infrastructure host facility
ERIDS	En Route Information Display Subsystem	S	Available power at infrastructure host facility
ERMS	Environmental Remote Monitoring System	S	Available power at infrastructure host facility
ESRN	ERIT Surveillance Radar Network	S	Available power at infrastructure host facility
ETMS	Enhanced Traffic Management System	A	
FAB	Fan and Blower System	S	Not Critical Power
FCPU	Facility Central Processor Unit	S	Available power at infrastructure host facility
FDEP	Flight Data Entry and Printout Equipment	S	Available power at infrastructure host facility
FDIOR	Flight Data Input/Output Remote	S	Available power at infrastructure host facility
FDPS	Flight Data Processing System	A	
FLD	Intermediate Fields and Landing Area	1	
FM	Fan Marker	D	
FOTS	Fiber Optic Transmission System	S	Available power at infrastructure host facility
FSS	Flight Service Station	4	
FTI	FAA Telecommunications Infrastructure	S	Customer Premises Equipment at ATCT/TRACON is be split between two sources.
GDL	Guidance Light Facility	4	

FACILITY TYPE	DESCRIPTION	POWER SOURCE CODE (See Section 4-1)	COMMENTS
GOES	Geostationary Operational Environmental Satellite System	S	Available power at infrastructure host facility
GS	Glide Slope	D (equipment battery) CPA = 1	Same as LOC
GUARD	Guard House	4	
HAZMB	Hazardous Materials Building	4	
HCVR	High Capacity Voice Recorder	A	
HEAT	Central Heating Facility - Per Unit	S	Available power at infrastructure host facility
ICMS	Integrated Control and Monitor System	S	Available power at infrastructure host facility
ICSS	Integrated Communications Switching System	A Other	AFSS, TRACONS with ARTS III Available power at infrastructure host facility
IDF	Interference Direction Finder	S	Available power at infrastructure host facility
IM	Inner Marker	D	
ISD	Interim Situation Display	A	
ITWS	Integrated Terminal Weather System	A	ATCT / TRACON
IVSR	Interim Voice Switch Replacement	S	Available power at infrastructure host facility.
JAWS	Juneau Airport Wind System	S	Available power at infrastructure host facility
LCOT	UHF/VHF Link Terminal	4	
LDA	Localizer Directional Aid	S	Co-located with GS and LOC
LDIN	Lead in Light Facility	4	
LFDS	Large Facility Demarcation System	A	Available power at infrastructure host facility
LIDAR	Light Detection and Ranging	1	
LLWAS	Low-Level Wind Shear Alert System	D S	Sensor Central/Display Equipment
LOC	Localizer	D (equipment battery) CPA = 1	Same as GS
LOM	Compass Locator at the ILS Outer Marker	D	
MALS	Medium Intensity Approach Lighting System	CAT I = 4 CPA = 1	
MALSF	Medium Intensity Approach Lighting System with Sequenced Flashing Lights	CAT I = 4 CPA = 1	
MALSR	Medium Intensity ALS (MALS) with Runway Alignment Indicator Lights	CAT I = 4 CPA = 1	
MCT	Maintenance Communications Transceivers	S	Available power at infrastructure host facility

FACILITY TYPE	DESCRIPTION	POWER SOURCE CODE (See Section 4-1)	COMMENTS
MDS	Master Demarcation System	S	Available power at infrastructure host facility
MEARTS	Micro-En Route Automated Radar Tracking System	S	Available power at infrastructure host facility
MM	Middle Marker	D	
MODE S	Mode Select Beacon System	1	
MRU	Multilateration Remote Unit	S	Available power at infrastructure host facility
MSIP	Mission Support Internet Protocol (IP) Network	S	Available power at infrastructure host facility
MX	Mobile Engine Generator	W	
NADIN	National Airspace Data Interchange Network		
NASEB	NAS Equipment Building	4	
NASET	NAS Equipment Tower	X	
NDAG	NAS Defense Air-to-Ground	D	
NDB	Non-Directional Beacon	4	
NDGG	NAS Defense Ground-to-Ground	D	
NDRD	NAS Defense Remote Display	S	Available power at infrastructure host facility
NDRR	NAS Defense Radar Reformatter	S	Available power at infrastructure host facility
NRCS	National Radio Communications System	1	National Emergency Operating Facilities
NVR	NAS Voice Recorder	S	Available power at infrastructure host facility
NVS	NAS Voice Switch	S	Available power at infrastructure host facility
OCC	Operational Control Center	A	
ODALS	Omnidirectional Airport Lighting System	4	
ODAPS	Oceanic Display and Planning System	A	
OFDPS	Offshore Flight Data Processing System	A	
OM	Outer Marker	D	
PAPI	Precision Approach Path Indicator	4	
PARROT	Permanent Azimuth Reference Range Orientation Transponder	S	Available power at infrastructure host facility
PCS	Power Conditioning System	W	
PRM	Precision Runway Monitor	1	PRM is equipped with its own internal UPS. Facility UPS is not required.
PSN	Packet Switching Node	S	Available power at infrastructure host facility
PX	Primary Power Engine Generator	W	
RBPM	Remote Beacon Performance Monitor	S	Available power at infrastructure host facility

FACILITY TYPE	DESCRIPTION	POWER SOURCE CODE (See Section 4-1)	COMMENTS
RCAG	Remote Center Air/Ground	D 1 A 6	All, with exceptions below Non-solid state, Alternating Current, Linear Power Amplifier (LPA) Equipment at ARTCC Equipment on oil platforms, where available
RCE	Radio Control Equipment	S	Available power at infrastructure host facility
RCIU	Remote Control Interface Unit	S	Available power at infrastructure host facility
RCLR	Radio Communications Link Repeater	D 1	Single Path Co-located Link Paths
RCLT	Radio Communications Link Terminal	S	Available power at infrastructure host facility
RCO	Remote Communications Outlet	4	
REIL	Runway End Identification Lights	4	
RID	Runway Incursion Device	S	Available power at infrastructure host facility
RMCF	Remote Monitor Control Facility	S	Available power at infrastructure host facility
RMLR	Radar Microwave Link Repeater	1 A	Single Long Range Radar (LRR) Path Dual/triple LRR Path
RMLS	Remote Monitoring and Logging System	1 A	 AOCC,MOCC,POCC,NOCC
RMLT	Radar Microwave Link Terminal	S	Available power at infrastructure host facility
RMVC	Remote Maintenance VORTAC Concentrator	S	Available power at infrastructure host facility
RRCS	Remote Radio Control System	S	Available power at infrastructure host facility
RRH	Remote Hygro-thermometers	4	
RRWDS	Radar Remote Weather Display System	S	Available power at infrastructure host facility
RTDS	Radar Tower Display System	S	Available power at infrastructure host facility; Includes remote tower processing equipment
RTR	Remote Transmitter/Receiver	D	When co-located with a facility UPS, the radios can be powered by the UPS if there is enough capacity.
RVR	Runway Visual Range	D Tasker RVR = 1	Airfield Equipment
RVR	Runway Visual Range	S	Tower Equipment Available power at infrastructure host facility
RWSL	Runway Status Lights	1 A	Field Equipment ATCT Equipment Only

FACILITY TYPE	DESCRIPTION	POWER SOURCE CODE (See Section 4-1)	COMMENTS
SACOM	Emergency Satellite Telephone Network	S	Available power at infrastructure host facility
SAWS	Stand Alone Weather Sensors	S	Available power at infrastructure host facility
SCIP	Surveillance and Communications Interface Processor	S	Available power at infrastructure host facility
SFAS	Security and Fire Alarm System	S	Available power at infrastructure host facility
SMUX	Statistical Multiplexer	S	Available power at infrastructure host facility
SSALR	Simplified Short Approach Lighting System with Runway Alignment	CAT I = 4 CPA = 1	
SSO	Self-Sustaining Outlet	W	
STARS	Standard Terminal Automation Replacement System	S	Available power at infrastructure host facility
STDDS	System Wide Information Management (SWIM) Terminal Data Distribution System (STDDS)	A	TRACON only
SWS	Surface Weather System	S	Field Equipment Controller Equipment
SX	Standby Engine Generator	W	
TACAN	Tactical Air Navigation	RTA-2 = 1 LPTA = D	
TADS	TRACON Automation Display Systems	S	Available power at infrastructure host facility
TAIU	Terminal Automation Interface Unit	S	Available power at infrastructure host facility
TANK	Fuel Storage Tank	W	
TBFM	Time Based Flow Management System	A	where critical power is available
TDDS	Terminal Data Display System	S	Available power at infrastructure host facility
TDLS	Tower Data Link Services	S	Available power at infrastructure host facility
TDWR	Terminal Doppler Weather Radar	A	
TELEX	Telephone Exchange	S	Available power at infrastructure host facility
TFDM	Terminal Flight Data Manager	S	Available power at infrastructure host facility
TFMS	Enhanced Traffic Management System	A	
TMLI	Television Microwave Link Indicator	S	Available power at infrastructure host facility
TMLT	Television Microwave Link Terminal	S	Available power at infrastructure host facility
TOWB	Tower Building	4	
TRACO	Terminal Radar Approach Control Facility		See Appendix D, Table 4, Facility Power System Topology and Facility Type

FACILITY TYPE	DESCRIPTION	POWER SOURCE CODE (See Section 4-1)	COMMENTS
TVS	Terminal Voice Switch	S	Available power at infrastructure host facility. RDVS is included.
TWEB	Transcribed Weather Broadcast	S	Available power at infrastructure host facility
UIC	Universal Interlock Connector	S	
VASI	Visual Approach Slope Indicator	4	
VCS	Video Compression System	S	Available power at infrastructure host facility
VOR	Very High Frequency Omnidirectional Range	D Alaska = D or 1	Alaska Facilities local SSC determines the need for engine generator.
VOT	VHF Omnidirectional Range Test	4	
VRS	Voice Recorder System	S	Available power at infrastructure host facility
VSBP	Voice Switch Bypass	S	Available power at infrastructure host facility
VSCS	Voice Switching and Control System	S	Available power at infrastructure host facility
VTABS	VSCS Training and Backup System	S	Available power at infrastructure host facility
WAAS	Wide Area Augmentation System	A	
WAM	Wide-Area Multilateration System	S	Available power at infrastructure host facility
WDS	Weather Display Sub-System	S	Field Equipment Controller Equipment
WEF	Wind Measuring Equipment F-400 series	S	Field Equipment Controller Equipment
WME	Wind Measuring Equipment	S	Field Equipment Controller Equipment
WMSCR	Weather Message Switching Center Replacement	S	Available power at infrastructure host facility
WSP	Weather Systems Processor	1	Available power at infrastructure host facility

Appendix C. Power System Architectures

Table C-1. Power System Architecture Codes

Code	Architecture Description	
CPDS3	CPDS Critical Power Distribution System Type 3	PSG Architecture
CPDS2	CPDS Critical Power Distribution System Type 2	PSG Architecture
CPDS1	CPDS Critical Power Distribution System Type 1	PSG Architecture
CPDS0	CPDS Critical Power Distribution System Type Radial	PSG Architecture
ACEP2	ACEPS ARTCC Critical/Essential Power System 2	PSG Architecture
ACEPS	ACEPS ARTCC Critical/Essential Power System	PSG Architecture
DRPDS	Dual Redundant Power Distribution Systems	PSG Architecture
CRPDS	Critical Redundant Power Distribution System	PSG Architecture
DCBUS	PSG Program Office DC BUS	PSG Architecture
BCPS	Battery Charger Power Supply	Generic Architecture
GRCB	Generic Radial Critical Bus - Utility Power, Engine Generator, facility UPS	Generic Architecture
GREB	Generic Radial Essential Bus. Utility Power, Engine Generator. A mini-UPS or dc battery system may be provided to supply uninterruptible, conditioned power.	Generic Architecture
GMUD	GMUD - Generic mini-UPS or dc battery system	Generic Architecture
OTHER	Other configurations not defined	To be determined (TBD)
NEUO	Non-Essential, Utility Only	TBD
NONE	None	TBD

Table C-2. Bus Support Matrix

Code	Supported Buses			
	Critical	DC	Essential	Non-Essential
CPDS3	Yes	No	Yes	Yes
CPDS2	Yes	No	Yes	Yes
CPDS1	Yes	No	Yes	Yes
CPDS0	Yes	No	Yes	Yes
ACEP2	Yes	No	Yes	Yes
ACEPS	Yes	No	Yes	Yes
DRPDS	Yes	No	Yes	Yes
CRPDS	Yes	No	Yes	Yes
DCBUS	No	Yes	Yes	Yes

Code	Supported Buses			
BCPS	No	Yes	Yes	Yes
GRCB	Yes	No	Yes	Yes
GREB	No [1]	Yes [1]	Yes	Yes
GMUD	Yes [1]	Yes [1]	Yes	Yes
OTHER	Yes [1]	Yes [1]	Yes	Yes
NEUO	No	No	No	Yes
NONE	n/a	n/a	n/a	n/a

Note: 1 – Depends on actual equipment in place.

Appendix D. Staffed Infrastructure Facilities

Air Traffic Services Facilities, including ARTCC, TRACON, ATCT, and CERAP, host multiple NAS services and systems. For these facilities, Air Traffic Services and Power Services Group have developed the following table to guide the selection of the appropriate Power System Topology. Three key elements determine the type of power system required: (1) the equipment at the facility; (2) mission criticality, and; (3) customer needs. National Airspace System Requirements Document NAS-RD-2013 or current version provides FAA guidance for the establishment of power system configuration requirements. That document take precedence over the information provided in this appendix. The table in this appendix merely provides a convenient summary.

There are several developed system architectures for FAA power systems that are all included under the general "Commercial Power + Engine Generator + UPS", Power Source code A. These include CPDS type 3, CPDS type 2, CPDS type 1, CPDS Basic, ACEPS modified split bus, ACEPS Power Distribution System, Dual Redundant Power Distribution Systems (DRPDS), Critical Redundant Power Distribution Systems (CRPDS), Radial with EG and UPS. These systems differ in complexity, cost of installation, availability, and maintainability of service. Additional technical information can be found on the Power Services Group website (See https://my.faa.gov/org/linebusiness/ato/operations/facilities_engineering/power_services).

Table D-1. Facility Power System Topology and Facility Type

FAA Facility	Typical Power System Topology	Code
ARTCC	ACEPS or ACEPS 2 power system	ACEP2, ACEP3
MCF, NextGen large facility	CPDS Type 2 or CPDS Type 3	CPDS2, CPDS3
CERAP	CPDS Type 2	CPDS2
Focus 40+ Facilities	CPDS Type 1 or CPDS Type 2	CPDS1, CPDS2
ATCT or TRACON Level 12	CPDS Type 2	CPDS2
ATCT or TRACON Level 11	CPDS Type 1 or CPDS Type 2	CPDS1, CPDS2
ATCT or TRACON Level 10	CPDS Type 1	CPDS1
ATCT or TRACON Level 9	CPDS Type 1	CPDS1
TRACON Level 8	CPDS Type 1	CPDS1
ATCT Level 8	CPDS Type Radial	CPDS0
TRACON Level 7	CPDS Type 1	CPDS1
ATCT Level 7	CPDS Type Radial	CPDS0
ATCT or TRACON Level 6	CPDS Type Radial	CPDS0
ATCT or TRACON Level 5	CPDS Type Radial	CPDS0
ATCT or TRACON Level 4	CPDS Type Radial	CPDS0

Notes:

1. This table provides general guidance for new construction. Depending on equipment used at a specific site, specific site requirements, and ATO-T, ACEPS and Next Gen Program Office's determinations, the power system type may vary from the values provided in this table. The program office will provide justification and power system to be installed in the requirements document.
2. CPDS Type Basic power system topology can be used for upgrades of installed power system sustainment projects. This is necessary due to modernization risks, complexity, outage durations, and feasibility coupled with the complexity of modernizing existing facilities supporting NAS operations. Mini-UPSs are acceptable for retrofits and modification of existing distribution system for compliance with standards.
3. Low level private or contract ATCTs may use mini-UPS as necessary in lieu of a facility UPS.
4. For physically collocated facilities with the same power distribution system, the facility that is the higher of the two ATC levels would apply.