

AC Fail Signal: A standard ANSI/VITA signal generated by the power supply used to indicate status of AC input. This signal is triggered when the input voltage drops below the minimum level. *Several NAI designs have ANSI/VITA signaling available.*

Alternating Current or AC: Is a periodically varying current flow, which averages zero over regular intervals of time. Typically this current flow reverses between positive and negative values.

Ambient Temperature: The average temperature of the still air, which immediately surrounds the power supply, converter or other device.

Ampere (Amp or A): The measure of current expressed as the flow of one coulomb per second, past a given point of a circuit in a power supply or other device.

ANSI: Abbreviation for American National Standards Institute, which is an industry agency responsible for developing standards.

ANSI/VITA Power Supply Signaling: Standard signals used between the power supply and the system computer which monitor things such as input voltage and reset conditions.

Apparent Power: The power value which is obtained in an AC circuit and is the product of the RMS current times the RMS voltage.

Auxiliary Supply: A source of power which is supplied from a source other than the main load power.



Balun: (Short for balanced/unbalanced) is a choke or a transformer commonly used as an EMI filter component on the input of a power supply to suppress common-mode and differential-mode signals.

Bandwidth: A set or a "band" of frequencies bounded by an upper and a lower limit.

Baseplate: A mounting plate, which is used to conduct heat away from power supply components. A Base-plate is usually made of flat, very smooth aluminum. The baseplate is typically mounted to a heat sink which is somewhere in the system which it is powering. Thermal compound or a thermal pad typically is used to assist with the heat dissipation.

Baseplate Temperature: The temperature, which is measured at the hottest spot on the base of the power supply or converter during its operation.

Blackout: A total loss of electrical power.

Bleeder Resistor: A resistor, which is used to dis-charge a capacitor or as a minimal load for output stabilization on a power supply.³

Breakdown Voltage: Is the maximum voltage (AC or DC), which can be applied from the input to output, input to chassis or output to chassis, which will not cause damage to the power supply.

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Brownout: A reduction of input voltage on an AC power line, which may be induced either voluntarily or in-voluntarily.

Built-In Test: The capability of a power supply or converter to monitor some key functions and to identify a failure condition to the system which it is part of.

Burn-In: Operation of a power supply for an extended period (may be at elevated temperature) with the intent of detecting possible defects and weeding out "infant mortality" of components.

Bus: The common, primary power conductor which routes power to separate circuits or loads in a power supply.



CE: Is a marking of the European Union regulatory community which symbolizes the compliance of the product with all essential requirements relating to safety, public health and consumer protection.

CFM: Abbreviation for Cubic Feet per Minute. This is used to measure the volume of air flowing in a system.

Chassis Ground: The voltage potential of the chassis or other reference point in a power supply (or other device) with a non-conducting chassis.

Circuit Breaker: A mechanical device designed to open and close a circuit at a predetermined over-load. Circuit breakers can be reset.

Clock: In switch mode power supplies such as NAI designs, a clock is used to produce modulated power pulses, which control power transfer.

Cold Plate: Is a surface on which a component such as a conduction cooled power supply is mounted for the purpose of heat transfer from the baseplate.

Common Mode Noise: Is the component of noise, which appears equally and in-phase with both the DC outputs and their return lines with respect to a common ground.

COTS: Refers to the use of Commercial Off-The-Shelf equipment within an application including military applications.

Common Ground: A ground conductor, which is common to two or more circuits.

Component De-Rating: Is defined as the practice of applying components at lower than their maximum rating (e.g. voltage, current, or temperature) to reduce stress and provide design margins which in-turn increases reliability and operating life. **All NAI power supplies are designed with component de-rating to NAVMAT/NAVSO P-3641.**

Conduction Cooling: Conduction cooled designs provide for appropriate thermal management in the absence of circulating cooling air. **Most NAI power supply designs are designed to be conduction cooled via a baseplate.** Thermal compound or a thermal pad between the baseplate and heat sink typically is used to assist with the heat dissipation.

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Conducted Interference: Is an undesirable electromagnetic energy, appearing on the line, which originates from the power supply. This interference may be conducted into other sensitive equipment and cause malfunction or otherwise affect the operation of the equipment. Conducted EMI is typically taken care of by line filters.

Conformal Coating: An insulating layer, which protects the circuitry of the power supply against things such as moisture, humidity, fungus, dust, extreme temperatures, shock and vibration. This in turn enhances the safety and reliability of the power supply. Conformal coating is applied to the circuit cards either by spraying or dipping.

Convection Cooling: When a power supply transfers its heat via the movement of air (or in some cases fluid) along the surfaces of components which dissipate heat.

Crowbar: A protection circuit in power supplies which is used to pull down or clamp the output to approximately zero volts. This is done to avoid damage to load components in the event a pre-determined voltage is exceeded.

CSA: Abbreviation for Canadian Standards Association, which is an independent agency that tests and certifies safety of electronic equipment for the Canadian marketplace.

Current Share: A technique where two or more power supplies are connected in parallel or in a redundant manner. This allows for a proportional sharing of the load across all current providing elements of a power system and also allows for a backup in the event of a power supply failure. ***Several NAI designs have this feature available.***

Current Limiting: A protection feature in a power supply which limits the maximum output current, thus protecting the power supply and the load from damage.



DC/DC Converter: A device, which converts a single, DC input into a DC output or multiple DC outputs of a different value. This converter may also change the polarity of the output as well. ***NAI standard products accommodate 28Vdc or 270Vdc inputs.***

D-Connector: An input and/or output connector which is mounted on the outside of a power supply or other device. This can be connected to a wiring harness that utilizes the opposite gender D-Connector: This type of connector allows for simple connects/disconnects. ***Many NAI standard power supply products utilize these.***

Delta Input Configuration: Is a three phase, AC input configuration which uses 3 wires (one for each phase). It is often used in shipboard applications to minimize the amount of current, which flows through the hull.

De-Rating: See Component De-Rating.

Direct Current or DC: The flow of current or electrons in one direction.

Drift: The change of an output of a power supply over time and after a warm-up period. This drift is independent of variables such as the input, the environment and the load.

Dynamic Load: A rapidly changing load which is specified in both total change and rate of change.

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Efficiency: The ratio of output power divided by the input power, which is used to determine the amount of heat dissipated during the conversion from input to output. (ex: 80 watts/100watts = 80% efficiency or 20 watts dissipation).
Efficiency of NAI power supply designs are specified at nominal line input and under a full load condition.

EMI: Is noise which can be generated by a power supply. EMI can be either conducted (reflected back to the line) or radiated (emitted in the area around the power supply).

EMI Filter: Is a device, which is used with a power supply system to attenuate the electrical emissions, generated during its operation. **All NAI power supplies are designed with internal EMI filtering as per Mil-Std-461**

Enable/Inhibit Signal: A signal (typically a logic signal) which turns the output of the power supply on or off.

ESD: Abbreviation for Electrostatic Discharge. When a static charge moves from one surface to another and have different potentials. When this static charge moves, it becomes a current that can damage or destroy electronic components.



Filter: An electronic device (or one or more discrete components) which attenuates signal energy, allowing only certain frequencies to pass.

Fold-back: A method of output protection (current limiting) whereby the output current decreases as the overload condition increases; reaching a minimum during a short circuit condition.

Forced Air Cooling: A method of reducing ambient temperature in a system through the use of fans. These fans move air across heat dissipating components and may either be internal or external to the power supply.



Ground: Is a connection used to connect electrical equipment to earth or another conducting body, serving as earth. Ground is designed to protect users of this electrical equipment from shock hazards.

Ground Fault: An un-intended electrical path between an energized circuit and ground.

Ground-Loop: An unintentionally induced feedback loop caused when two or more circuits share a common electrical return or ground line. A ground-loop condition causes undesirable voltage levels and current flow.



Harmonic Distortion: Distortion caused to a sinusoidal waveform by the switching action of a power supply. This distortion is characterized by the presence of harmonics of the fundamental frequency.

Heat Sink: A structure such as an extrusion, a metal plate, a case or some other means which is used to transfer heat away from sensitive components and/or circuits.

Hertz (Hz): Is a unit of measurement for frequency. One Hertz equals one cycle per second.

Hiccup Mode: A method of output protection in which the converter cycles on and off. This can be triggered by a short circuit or other output fault condition.

High Line: The highest specified input voltage at which the power supply will operate.

Hold-Up Time: A specified amount of time that the power supplies output(s) remains within their specifications following an interruption to input power due to a fault condition such as a short circuit or a transient condition.

Hot Swappable: The ability to remove or add a power supply to an operational and powered up system, without causing any loss of power to that system.



Input Transient: A spike or a step change which occurs on the input voltage to a power supply. *All NAI designs provide input transient protection as per Mil-Std 704.*

Input-Output Isolation: DC isolation which is provided between the input and the output circuits of a power supply.

In-Rush Current: The peak, instantaneous input current drawn by a power supply during turn-on.

Insulation Resistance: The resulting resistance which is provided to the flow of current by some form of insulating material. This resistance is typically measured in Meg-Ohms

Isolation: The electrical separation between the input and output circuits of a power supply or DC/DC converter.

Isolation Voltage: The specified maximum AC or DC voltage which may be continuously applied from input to output and/or chassis of the power supply or DC/DC converter.



Line Regulation: The percentage of change in output voltage as the input voltage is varied over its specified limits; with the load and temperature parameters remaining constant.

Line Transient: A disturbance or interruption, which is outside the specified operating range of an input or a supply voltage.

Load: An electrical circuit or component which when connected across the output of a power supply determines the current flow and amount of power used.

Load Regulation: The percent change in output voltage as the load is changed from minimum to maximum, at constant line and constant temperature. The load change may be specified for other than no load to full load, such as 50% load to full load.

Load Transient Recovery: Recovery of the output voltage to within regulation limits after the occurrence of a transient (overshoot).

Logic Ground: Common return line for all logic signals.

Low Line: The lowest specified input voltage at which the power supply will operate.



Mil-Std-461: Specifies requirements for the control of Electromagnetic Interference (EMI) for Military and COTS products. This includes Conducted Emissions (CE), Conducted Susceptibility (CS), Radiated Emissions (RE) and Radiated Susceptibility (RS). ***NAI power supply designs include built-in EMI filtering as per Mil-Std 461***

Mil-Std-810: Is an environmental specification intended to standardize how equipment withstands a wide variety of physical conditions and environments. This will effect material selection & design considerations of the equipment. Examples include such things as Temperature, Shock, Vibration and Humidity.

NAI designs all power supplies to comply with Mil-Std 810

Mil-Std-704: Establishes requirements for electrical power characteristics of generators and other power systems aboard aircraft at the interface between the electrical power system and the user equipment.

NAI power supplies provide input transient protection per Mil-Std 704

Mil-Std 1399: Establishes electrical interface characteristics for shipboard equipment utilizing AC power, ensuring compatibility between user equipment and the electric power system. Examples include things such as waveform harmonic distortion, power factor, surge current, frequency transients and voltage transients.

Several NAI designs comply with Mil-Std 1399

Mil-Std 1275: Determines characteristics of 28 volt DC power systems in military vehicle power systems at the interface between the electrical power system and the user equipment. Examples include initial engagement surges, starting disturbances & cranking levels, ripple, spikes, transients, steady state voltage and fault conditions.

Several custom NAI designs comply with Mil-Std 1275

Mil-Std 167: Covers the requirements of Naval equipment with regards to both internally excited vibrations & externally imposed vibration. **Several custom NAI designs comply with Mil-Std 167**

MTBF (Also referred to as Reliability): Is the abbreviation for Mean Time Between Failure. This is the average length of time in between failures, which is expressed in hours. This time is established either from actual field operation experience or through calculations such as Mil-Handbook 217.



NAVMAT Component De-Rating: Is the practice of applying components at lower than their maximum rating (e.g. voltage, current, or temperature). Reliability (MTBF) and operating life are improved through reduced component stress. **All NAI power supplies are designed with component de-rating to NAVMAT/NAVSO P-3641**

Neutral: Is an AC return which is connected (at some point) to ground, but is a current carrying path. Because it is a current carrying path it should never be used as a safety ground.

Noise: Electrical signals produced by un-wanted sources.



Open Frame Power Supply: A mechanical design technique in which the power supply does not have an enclosure over the electronics. This type of design is typically force air cooled.

Operating Temperature Range: The range in which a power supply or DC/DC converter operates safely and performs within its specifications. This temperature is measured at either ambient, the baseplate or the case.

Output: The energy delivered from a power supply. **NAI designs are available with up to 9 outputs.**

Output Power: The total wattage of the individual current ratings for each voltage output of a power supply. Power supplies typically have both a continuous and a peak rating.

Output Ripple and Noise: See PARD

Over-Current Protection: A power supply feature which protects both the power supply and load from excessive current, including short-circuit current.

Over-Voltage Protection (OVP): A power supply feature which provides automatic, electronic shutdown of the output(s) when they exceed a preset value. This is provided in order to protect the attached load from any type of power supply failure.



Parallel Operation: Allows for a proportional sharing of the load across all current providing elements of a power system. This is accomplished by connecting (or paralleling) the outputs of two or more power supplies. ***The current share feature of NAI power supplies allows for this type of operation.***

PARD: Abbreviation for ***Periodic and Random Deviation*** is the sum of all of the ripple and noise components. This is typically stated in a p-p value and is measured within a specified bandwidth.

Peak Current: The maximum amount of current which an output is capable of sourcing for brief periods of time.

Potting: An insulating material which is used to encapsulate the components in a circuit. This encapsulation is often used for protection from environmental factors.

Power Density: Is the ratio of the power available from a power source to either its weight or it's volume. Examples: Watts/Pound or Watts/Cubic Inch.

Power Factor: The ratio of true power to apparent power in an AC circuit. In power conversion technology, power factor is used in conjunction with describing the AC input current to the power supply.

Power Factor Correction (PFC): The addition of a circuit in a power supply for the purpose of bringing the AC input voltage and AC input current to be approximately in phase of each other. In addition the useful power which is drawn is increased, thus reducing harmonic distortion. ***Several NAI standard and custom products have PFC capability.***

Power Fail Signal: A power supply generated (logic) signal which provides notification of a loss of line (input) voltage. This notification gives the user a chance to take any necessary action such as a switch over to backup power before the system goes down.

Power Good Signal: A power supply generated (logic) signal which provides indication that the outputs are within the specification limits.

Power-Up Sequencing: The technique of establishing a desired order of activating the outputs of a multiple output power supply. This is done to prevent damage to components such as processors which are affected by improper sequencing of voltages being applied to them.



Radiated Interference: An electromagnetic energy without a direct conducting path which is generally the result of electromagnetic fields around external wiring or inadequate shielding provided by the power supply case.

Redundancy: Use of multiple power supplies in order to provide continuing operation in the event of a failure of a single supply. ***Several of the NAI power products offer current share capability which can be used for redundancy.***

Regulation: The ability of a power supply to maintain an output voltage within a specified tolerance while referencing changing conditions of input voltage and/or load.

Reliability: See MTBF

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Remote (error) Sense: A power supply feature which compensates for voltage drops in wires connected from the output to the loads. ***NAI power supplies compensate for up to 0.5volt drops.***

Remote Turn On/OFF: A signal (typically logic) which inhibits the output(s) of a power supply.

Ripple: The magnitude of AC voltage appearing superimposed on the DC output, specified in peak to peak volts or expressed as a percent of the nominal output voltage.

RMS: Is the abbreviation for Root Mean Square. It is the square root of the average value of the squares of all the instantaneous values of current or voltage during one-half cycle of an alternating current. For a sine wave, the RMS value is approximately equal to 0.707 times the peak value of the waveform. RMS is also called the effective value.



Safety Ground: A conductive path to earth that is designed to protect persons from electrical shock by shunting away any dangerous currents that might occur due to malfunction or accident.

Short Circuit: A zero resistance path caused by a direct connection, resulting in a path for current to flow freely.

Short Circuit Protection: A built in power supply feature which limits the output current (under short circuit conditions at the load) of the power supply in order to prevent damage to itself.

Signal Ground: The common return or reference point for analog signals.

Status Signaling: Logic signals used to either indicate or report the status of conditions on the power supply. Examples of these signals can be over-temperature, over-current and output good.

Storage Temperature Range: The range at which a power supply or other devices may be stored in a non-operating condition with no effect or degradation of its operation or operating life.

Sys Reset: A standard ANSI/VITA signal from the power supply which indicates that a reset (such as a power up) is in progress.

Switching Frequency: The rate at which the DC voltage is switched in a DC/DC converter or switching power supply.

Switching or Switch Mode Power Supply: A power supply which utilizes a closed loop, switching circuit to regulate it's output(s). The power supply function is provided through low loss components such as capacitors, inductors and transformers, using switches that are in one of two states, on or off. ***All NAI designs are switching.***



Wattage: This is a form of power measurement. The watts rating is the volts rating multiplied by the amps rating. Watts represent the actual delivered energy to the load.

WYE Input Configuration: A 3 phase power supply input configurations which utilizes four wires.



Temperature Coefficient: The average percent change in the output voltage per degree centigrade change in ambient temperature over a specified temperature range.

Temperature Cycling: Is a form of stress screen testing which determines the ability of parts to resist extremely low and extremely high temperatures, as well as their ability to withstand cyclical exposures to these temperature extremes. Temperature Range: See Operating Temperature Range and Storage Temperature Range.

Thermal Compound: A fluid or paste with very low thermal resistance, which is spread between the baseplate of a power supply and a heat sink or system chassis. This compound ensures high thermal conductivity, thus improving heat dissipation.

Transient: A variation or a change in parameters which are typically associated with input voltage or the loading of the output.

Thermal Pad: A flexible pad with very low thermal resistance, which is cut to the dimensions of the power supply baseplate and placed between the power supply and the heatsink, ensuring high thermal conductivity, thus improving heat dissipation.

Thermal Protection: A power supply protection circuit which shuts the power supply down in the event of unacceptably high internal temperatures.

Three Phase Power Input: An input to a power device which is comprised of three alternating current inputs with their voltages displaced by 120°.



UL: Is an abbreviation for Underwriters Labs. UL is a private organization that evaluates electrical and safety equipment using standards, which UL has written for the specific equipment category.

Under-Voltage Protection: A power supply feature which provides automatic, electronic shutdown of the output(s) when they fall below a preset minimum value. This is provided in order to protect the attached load from any type of power supply failure.



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