SAE International™

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1939-75

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Application Layer—Generator Sets and Industrial

Foreword—This series of SAE Recommended Practices have been developed by the SAE Truck and Bus Control and Communications Network Subcommittee of the SAE Truck and Bus Electrical and Electronics Committee. The objectives of the subcommittee are to develop information reports, recommended practices, and standards concerned with the requirements, design, and usage of devices that transmit electronic signals and control information among vehicle components. The usage of these Recommended Practices is not limited to truck and bus applications; other applications may be accommodated with immediate support being provided for construction and agricultural equipment, and stationary power systems.

These SAE Recommended Practices are intended as a guide toward standard practice and are subject to change so as to keep pace with experience and technical advances.

This particular document, SAE J1939-75, describes the parameters and parameter groups that are predominantly associated with monitoring and control generators and driven equipment in electric power generation and industrial applications.

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1 **Scope**—The SAE J1939 documents are intended for light, medium, and heavy-duty vehicles used on or off road as well as appropriate stationary applications which use vehicle derived components (e.g., Generator sets). Vehicles of interest include, but are not limited to: on- and off-highway trucks and their trailers, construction equipment, and agricultural equipment and implements.

The purpose of these documents is to provide an open interconnect system for electronic systems. It is the intention of these documents to allow Electronic Control Units to communicate with each other by providing a standard architecture.

This particular document, SAE J1939-75, describes the parameters and parameter groups that are predominantly associated with monitoring and control generators and driven equipment in electric power generation and industrial applications. Parameters and parameter groups that may be associated with monitoring and control of the power units, such as engines, turbines, etc, that power the generators and driven industrial equipment and which may be applied in on- and off-highway applications, shall be documented in SAE J1939-71.

2 References

2.1 Applicable Publications—General information regarding this series of recommended practices is found in SAE J1939. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J1939 Recommended Practice for a Serial Control and Communications Vehicle Network is the parent document and should be referenced in general.

SAE J1939-71 Vehicle Application Layer

2.2 Related Publications—The following publications are provided for information purposes only and are not a required part of this document.

2.2.1 ISO PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

ISO 11898 (Amended) Road Vehicles—Interchange of digital information—Controller area network (CAN) for high-speed communications AMENDMENT 1

3 **Definitions**—See SAE J1939 for terms and definitions that are not defined in this document.

3.1 AC Apparent Power—The range and resolution requirements for AC Apparent Power are the same as for AC Real Power. Apparent power is an unsigned quantity, but there is no benefit in having a larger range for apparent power than for real power.

3.2 AC Frequency—Measured AC frequency is an unsigned quantity. Common nominal frequencies in use worldwide for generator sets are 50 Hz, 60 Hz, and 400 Hz. The minimum resolution for display and control is 0.1 Hz.

When AC frequency is used to represent frequency difference, such as might be used by a synchronizer, then a signed quantity is required.

3.3 AC Kilowatt-hour—AC Kilowatt-hour measures the total energy output of a generator set, or the total import/export energy of a utility incomer. AC Kilowatt-hour could be considered a signed quantity, since reverse power would subtract (or, for a utility incomer, import and export power would cancel each other). In practice, if there is a significant amount of power flowing in either direction at different times, the "positive" and "negative" flow should be accumulated separately. A utility might charge a different rate for

"imported" power than it pays for "exported" power. Therefore it is desirable to treat this as an unsigned quantity, and to accumulate positive and negative kW separately.

For a generator set, the range should be sufficient to accumulate the output of a 10MW generator set operating continuously at 80% capacity for 100000 hours: 800,000 MWH. (For a utility incomer, the range must be somewhat higher.)

3.4 AC Phase Difference—AC Phase Difference represents the phase difference between the Bus #1 and Utility or Generator voltages. The voltages tested may be line-line or line-neutral, and may be based on a single phase or a combination of two or more phases. This is up to the control generating the data. The phase difference is a signed angle ranging from -180 degrees to +180 degrees. A resolution of 0.1 degree is adequate.

3.5 AC Power Factor—AC Power Factor measures the ratio of real power to apparent power, sometimes approximated as the cosine of the angle between voltage and current for a single phase. The range is -1.0 to +1.0. Negative values indicate reverse power flow. A value of 1.0 indicates that all of the power flow is real power delivered to the load (i.e. a purely resistive load). A value of 0.0 indicates that no real power is delivered to the load (i.e. a purely reactive load).

Power factor can be leading (a capacitive load) or lagging (an inductive load). This is not indicated by the sign of the power factor, but by a separate flag.

3.6 AC Reactive Power—In a normally operating system, the reactive power will be less than half the real power. In order to allow for fault conditions, it is desirable to have the same range for reactive power as for real power. Reactive power is a signed quantity, like real power.

3.7 AC Real Power—AC Real Power must be signed since power may flow in both directions. The range for reverse power does not need to be as large as the range for positive power for a generator set, but this quantity might also be used to measure power imported from a utility. In this case, a negative value for real power indicates power delivered (sold) to the utility, and might equal the total capacity of the generator sets.

A "large" diesel or gas generator set might have a capacity of around 10 MW (about 13000 HP). Assuming it is desired to measure the power output of up to 20 generator sets paralleled together, the total capacity will be around 200 MW. The required resolution for a small (20 kW) generator set is approximately 0.1 kW = 100 W.

3.8 AC RMS Current—The maximum size breaker commonly available for generator sets is 6500 A. It is desirable to provide a 10X allowance for fault current measurement, which results in a desired range of 0 to 65000 A.

3.9 AC RMS Voltage—The maximum voltage likely to be measured by a generator set monitoring device is 33 kV (the UK heavy distribution voltage). Utility voltage may be much higher, but will be stepped down for paralleling with generator sets**.**

3.10 Dead Bus—Dead Bus flag indicates whether the synchronizer or sync check relay has determined that the bus is dead for the purpose of connecting the utility to the bus. When standby generator sets are brought online in response to a utility failure, the first generator set to connect to the bus must connect to a dead bus without synchronizing. Subsequent generator sets may synchronize to the first online generator set. A dead bus is typically indicated by a bus voltage less than a programmed threshold, but a more sophisticated method may be used. (The dead bus threshold used for Bus #1 / Utility synchronization may be different than that used for Bus #1 / Generator synchronization.) The voltages tested may be line-line or line-neutral, and may be based on a single phase or a combination of two or more phases. This is up to the control generating the flag.

3.11 Total AC Energy—Total AC Energy is the total energy exported or imported by the generator set or utility.

For generator sets, exported energy is energy delivered to the load (the normal situation). Imported energy is energy taken from the load or bus (reverse power, an abnormal and potentially damaging situation).

For utilities, exported energy is energy delivered by the generator set to the utility. Imported energy is energy delivered by the utility to the load. Unlike the case with generator sets, both exported and imported energy are normal for a utility.

3.12 Utility Incomer—Any source of power that is present for which the user is not responsible for the generation of that power. This is typically the local utility or power company, but could be other power sources, such as the power coming from a system at a separate building.

4 Abbreviations

A	Ampere
AC	Alternating Current
Hz	Hertz
kWh	Kilowatt hour
RMS	Root Mean Square
V	Voltage
VA	Voltampere
VAr	Voltampere reactive
W	Watts

5 Technical Requirements—The application Layer provides a means for application processes to access the OSI environment. This layer contains management functions and generally useful mechanisms to support applications.

5.1 Parameters and Parameter Group Introduction

5.1.1 GENERAL PARAMETER GROUPING—The Parameter Groups are organized according to Generator, Utility, and Bus related parameter quantities. The Generator PGNs describe the generator output: voltage, current, frequency, and power. The Utility PGNs describe the input from a utility: also voltage, current, frequency, and power. The Bus PGNs describe the voltage and some other parameters on the bus, which is a point where multiple generator sets and utilities can be paralleled together to drive a load.

5.1.2 GENERATOR AND UTILITY PARAMETERS AND PARAMETER GROUPS—The Generator and Utility related PGNs are further organized according to Total and Per-Phase related parameter quantities. In a three-phase power system, the voltage, current, and power can be measured independently for each phase (labeled phase A, phase B, and phase C). These per-phase values can then be combined to form total (or average, or overall) quantities. For some generator configurations, the per-phase values are not meaningful, and the total quantities are the only values available. Frequency parameter information is in the per-phase PGNs in order to keep symmetry with the total PGNs, and to support independent frequency measurements on the individual phases. The SPN and PGN grouping of the Generator and Utility parameters are summarized in Table 1 and Table 2, respectively.

TABLE 1 - SPN AND PGN SUMMARY FOR GENERATOR PARAMETERS

Generator AC Quantities	Reference Type	Phase A	Phase B	Phase C	Total	Average
Real Power	PGN	65026	65023	65020	65029	-
	SPN	2453	2454	2455	2452	-
Apparent Power	PGN	65026	65023	65020	65029	-
	SPN	2461	2462	2463	2460	-
Reactive Power	PGN	65025	65022	65019	65028	-
	SPN	2457	2458	2459	2456	-
Power Factor	PGN	65025	65022	65019	65028	-
	SPN	2465	2466	2467	2464	-
Power Factor Lagging	PGN	65025	65022	65019	65028	-
	SPN	2519	2520	2521	2518	-
Line-to-Line AC RMS Voltage	PGN	65027	65024	65021	-	65030
	SPN	2441	2442	2443	-	2440
Line-to-Neutral AC RMS Voltage	PGN	65027	65024	65021	-	65030
	SPN	2445	2446	2447	-	2444
AC RMS Current	PGN	65027	65024	65021	-	65030
	SPN	2449	2450	2451	-	2448
AC Frequency	PGN	65027	65024	65021	-	65030
	SPN	2437	2438	2439	-	2436
KWh Import	PGN	-	-	-	65018	-
	SPN	-	-	-	2469	-
KWh Export	PGN	-	-	-	65018	-
	SPN	-	-	-	2468	-

TABLE 2 - SPN AND PGN SUMMARY FOR UTILITY PARAMETERS

Utility AC Quantities	Reference Type	Phase A	Phase B	Phase C	Total	Average
Real Power	PGN	65013	65010	65007	65016	-
	SPN	2487	2488	2489	2486	-
Apparent Power	PGN	65013	65010	65007	65016	-
	SPN	2495	2496	2497	2494	-
Reactive Power	PGN	65012	65009	65006	65015	-
	SPN	2491	2492	2493	2490	-
Power Factor	PGN	65012	65009	65006	65015	-
	SPN	2499	2500	2501	2498	-
Power Factor Lagging	PGN	65012	65009	65006	65015	-
	SPN	2553	2554	2555	2552	-
Line-to-Line AC RMS Voltage	PGN	65014	65011	65008	-	65017
	SPN	2475	2476	2477	-	2474
Line-to-Neutral AC RMS Voltage	PGN	65014	65011	65008	-	65017
	SPN	2479	2480	2481	-	2478
AC RMS Current	PGN	65014	65011	65008	-	65017
	SPN	2483	2484	2485	-	2482
AC Frequency	PGN	65014	65011	65008	-	65017
	SPN	2471	2472	2473	-	2470
KWh Import	PGN	-	-	-	65005	-
	SPN	-	-	-	2503	-
KWh Export	PGN	-	-	-	65005	-
	SPN	-	-	-	2502	-

5.1.3 BUS PARAMETER GROUPS—All bus PGNs are called “Bus #1 ...” to allow for multiple busses in a system. It is expected that future PGNs for other busses would be identical to the Bus #1 PGNs. The PGN grouping of the Bus parameters are summarized in Table 3.

TABLE 3 - SPN AND PGN SUMMARY FOR BUS #1 PARAMETERS

Bus #1 AC Quantities	Reference Type	Phase A	Phase B	Phase C	Average
Line-to-Line AC RMS Voltage	PGN	65003	65002	65001	65004
	SPN	2509	2510	2511	2508
Line-to-Neutral AC RMS Voltage	PGN	65003	65002	65001	65004
	SPN	2513	2514	2515	2512
AC Frequency	PGN	65003	65002	65001	65004
	SPN	2505	2506	2507	2504

Multiple gensets, loads, and possibly a utility may be connected to a bus at any time. Ignoring resistive losses, the voltage and frequency will be constant at all points on the bus. The current and power, on the other hand, will vary depending on where the sensing is done. Consider the example of two gensets G1 and G2, and one load L. Suppose they are connected on the bus in the configuration G1 ---- L ---- G2, so L is between the gensets. If the bus current is sensed between G1 and L, it will show the

current and power delivered by G1. If the bus current is sensed between G2 and L, it will show the current and power delivered by G2. These two quantities may be completely different. For this reason, Bus #1 current is not included in the Bus #1 Basic AC Quantities, and no Bus #1 power PGNs are currently defined.

5.1.4 SYNCHRONIZATION PARAMETER GROUPS—The synchronization PGNs are organized according to synchronization of Bus #1 to a generator set or utility. These PGNs contain parameters that would be generated by, or perhaps used by, a synchronizer or sync check relay to connect the generator set or utility to Bus #1. These parameters include AC Phase Difference, Voltage Match, Frequency Match, Phase Match, In Sync, and Dead Bus flag. The PGN grouping of the Synchronization parameters for Bus #1 to the Utility and the Generator are summarized in Table 4.

TABLE 4 - SPN AND PGN SUMMARY FOR SYNCHRONIZATION PARAMETERS

Synchronization Quantities	Reference Type	Bus #1 to Utility	Bus #1 to Generator
Frequency Match	PGN	64999	65000
	SPN	2533	2528
Voltage Match	PGN	64999	65000
	SPN	2532	2527
Phase Match	PGN	64999	65000
	SPN	2531	2526
Phase Difference	PGN	64999	65000
	SPN	2517	2516
Utility in Sync	PGN	64999	65000
	SPN	2534	2529
Dead Bus	PGN	64999	65000
	SPN	2535	2530

5.2 Parameter Definitions

The parameter definitions presented in this section of this document are listed in numerical order by SPN.

SPN 2436 - GENERATOR AVERAGE AC FREQUENCY—Average AC frequency measured at the generator output.

Data Length: 2 bytes
Resolution: 1/128 Hz/bit, 0 offset
Data Range: 0 to 501.9921875 Hz
Type: Measured
Suspect Parameter Number: 2436
Reference: PGN 65,030 SAE J1939-75

SPN 2437 - GENERATOR PHASE A AC FREQUENCY—AC frequency measured at the generator phase A output.

Data Length: 2 bytes
Resolution: 1/128 Hz/bit, 0 offset
Data Range: 0 to 501.9921875 Hz
Type: Measured
Suspect Parameter Number: 2437
Reference: PGN 65,027 SAE J1939-75

SPN 2438 - GENERATOR PHASE B AC FREQUENCY—AC frequency measured at the generator phase B output.

Data Length:	2 bytes
Resolution:	1/128 Hz/bit, 0 offset
Data Range:	0 to 501.9921875 Hz
Type:	Measured
Suspect Parameter Number:	2438
Reference:	PGN 65,024 SAE J1939-75

SPN 2439 - GENERATOR PHASE C AC FREQUENCY—AC frequency measured at the generator phase C output.

Data Length:	2 bytes
Resolution:	1/128 Hz/bit, 0 offset
Data Range:	0 to 501.9921875 Hz
Type:	Measured
Suspect Parameter Number:	2439
Reference:	PGN 65,021 SAE J1939-75

SPN 2440 - GENERATOR AVERAGE LINE-LINE AC RMS VOLTAGE—Average Line to Line RMS voltage measured at the generator output.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2440
Reference:	PGN 65,030 SAE J1939-75

SPN 2441 - GENERATOR PHASE AB LINE-LINE AC RMS VOLTAGE—Line to Line RMS voltage measured at the generator phase AB output.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2441
Reference:	PGN 65,027 SAE J1939-75

SPN 2442 - GENERATOR PHASE BC LINE-LINE AC RMS VOLTAGE—Line to Line RMS voltage measured at the generator phase BC output.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2442
Reference:	PGN 65,024 SAE J1939-75

SPN 2443 - GENERATOR PHASE CA LINE-LINE AC RMS VOLTAGE—Line to Line RMS voltage measured at the generator phase CA output.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2443
Reference:	PGN 65,021 SAE J1939-75

SPN 2444 - GENERATOR AVERAGE LINE-NEUTRAL AC RMS VOLTAGE—The average Line to Neutral AC RMS voltage measured at the Generator output.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2444
Reference:	PGN 65,030 SAE J1939-75

SPN 2445 - GENERATOR PHASE A LINE-NEUTRAL AC RMS VOLTAGE—Line to Neutral RMS voltage measured at the generator phase A output.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2445
Reference:	PGN 65,027 SAE J1939-75

SPN 2446 - GENERATOR PHASE B LINE-NEUTRAL AC RMS VOLTAGE—Line to Neutral RMS voltage measured at the generator phase B output.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2446
Reference:	PGN 65,024 SAE J1939-75

SPN 2447 - GENERATOR PHASE C LINE-NEUTRAL AC RMS VOLTAGE—Line to Neutral RMS voltage measured at the generator phase C output.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2447
Reference:	PGN 65,021 SAE J1939-75

SPN 2448 - GENERATOR AVERAGE AC RMS CURRENT—Average RMS current measured at the generator output.

Data Length:	2 bytes
Resolution:	1 A/bit, 0 offset
Data Range:	0 to 64,255 Amps
Type:	Measured
Suspect Parameter Number:	2448
Reference:	PGN 65,030 SAE J1939-75

SPN 2449 - GENERATOR PHASE A AC RMS CURRENT—RMS current measured at the generator phase A output.

Data Length:	2 bytes
Resolution:	1 A/bit, 0 offset
Data Range:	0 to 64,255 Amps
Type:	Measured
Suspect Parameter Number:	2449
Reference:	PGN 65,027 SAE J1939-75

SPN 2450 - GENERATOR PHASE B AC RMS CURRENT—RMS current measured at the generator phase B output.

Data Length:	2 bytes
Resolution:	1 A/bit, 0 offset
Data Range:	0 to 64,255 Amps
Type:	Measured
Suspect Parameter Number:	2450
Reference:	PGN 65,024 SAE J1939-75

SPN 2451 - GENERATOR PHASE C AC RMS CURRENT—RMS current measured at the generator phase C output.

Data Length:	2 bytes
Resolution:	1 A/bit, 0 offset
Data Range:	0 to 64,255 Amps
Type:	Measured
Suspect Parameter Number:	2451
Reference:	PGN 65,021 SAE J1939-75

SPN 2452 - GENERATOR TOTAL REAL POWER—Total real power delivered by the generator.

Data Length:	4 bytes
Resolution:	1 W/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 Watts
Type:	Measured
Suspect Parameter Number:	2452
Reference:	PGN 65,029 SAE J1939-75

SPN 2453 - GENERATOR PHASE A REAL POWER—The real power delivered by phase A of the generator.

Data Length:	4 bytes
Resolution:	1 W/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 Watts
Type:	Measured
Suspect Parameter Number:	2453
Reference:	PGN 65,026 SAE J1939-75

SPN 2454 - GENERATOR PHASE B REAL POWER—The real power delivered by phase B of the generator.

Data Length:	4 bytes
Resolution:	1 W/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 Watts
Type:	Measured
Suspect Parameter Number:	2454
Reference:	PGN 65,023 SAE J1939-75

SPN 2455 - GENERATOR PHASE C REAL POWER—The real power delivered by phase C of the generator.

Data Length:	4 bytes
Resolution:	1 W/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 Watts
Type:	Measured
Suspect Parameter Number:	2455
Reference:	PGN 65,020 SAE J1939-75

SPN 2456 - GENERATOR TOTAL REACTIVE POWER—The total reactive power delivered by the generator

Data Length:	4 bytes
Resolution:	1 VAr/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VAr
Type:	Measured
Suspect Parameter Number:	2456
Reference:	PGN 65,028 SAE J1939-75

SPN 2457 - GENERATOR PHASE A REACTIVE POWER—The reactive power delivered by phase A of the generator

Data Length:	4 bytes
Resolution:	1 VAr/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VAr
Type:	Measured
Suspect Parameter Number:	2457
Reference:	PGN 65,025 SAE J1939-75

SPN 2458 - GENERATOR PHASE B REACTIVE POWER—The reactive power delivered by phase B of the generator

Data Length:	4 bytes
Resolution:	1 VAr/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VAr
Type:	Measured
Suspect Parameter Number:	2458
Reference:	PGN 65,022 SAE J1939-75

SPN 2459 - GENERATOR PHASE C REACTIVE POWER—The reactive power delivered by phase C of the generator

Data Length:	4 bytes
Resolution:	1 VAr/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VAr
Type:	Measured
Suspect Parameter Number:	2459
Reference:	PGN 65,019 SAE J1939-75

SPN 2460 - GENERATOR TOTAL APPARENT POWER—The total apparent power delivered by the generator.

Data Length:	4 bytes
Resolution:	1 VA/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VA
Type:	Measured
Suspect Parameter Number:	2460
Reference:	PGN 65,029 SAE J1939-75

SPN 2461 - GENERATOR PHASE A APPARENT POWER—The apparent power delivered by phase A of the generator.

Data Length:	4 bytes
Resolution:	1 VA/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VA
Type:	Measured
Suspect Parameter Number:	2461
Reference:	PGN 65,026 SAE J1939-75

SPN 2462 - GENERATOR PHASE B APPARENT POWER—The apparent power delivered by phase B of the generator.

Data Length:	4 bytes
Resolution:	1 VA/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VA
Type:	Measured
Suspect Parameter Number:	2462
Reference:	PGN 65,023 SAE J1939-75

SPN 2463 - GENERATOR PHASE C APPARENT POWER—The apparent power delivered by phase C of the generator.

Data Length:	4 bytes
Resolution:	1 VA/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VA
Type:	Measured
Suspect Parameter Number:	2463
Reference:	PGN 65,020 SAE J1939-75

SPN 2464 - GENERATOR OVERALL POWER FACTOR—The average power factor of the generator.

Data Length:	2 bytes
Resolution:	1/16384 per bit, -1 offset
Data Range:	-1.00000 to 2.921813965
Operational Range:	-1.00000 to 1.00000
Type:	Measured
Suspect Parameter Number:	2464
Reference:	PGN 65,028 SAE J1939-75

SPN 2465 - GENERATOR PHASE A POWER FACTOR—The power factor of phase A of the generator.

Data Length:	2 bytes
Resolution:	1/16384 per bit, -1 offset
Data Range:	-1.00000 to 2.921813965
Operational Range:	-1.00000 to 1.00000
Type:	Measured
Suspect Parameter Number:	2465
Reference:	PGN 65,025 SAE J1939-75

SPN 2466 - GENERATOR PHASE B POWER FACTOR—The power factor of phases B of the generator.

Data Length:	2 bytes
Resolution:	1/16384 per bit, -1 offset
Data Range:	-1.00000 to 2.921813965
Operational Range:	-1.00000 to 1.00000
Type:	Measured
Suspect Parameter Number:	2466
Reference:	PGN 65,022 SAE J1939-75

SPN 2467 - GENERATOR PHASE C POWER FACTOR—The power factor of phases C of the generator.

Data Length:	2 bytes
Resolution:	1/16384 per bit, -1 offset
Data Range:	-1.00000 to 2.921813965
Operational Range:	-1.00000 to 1.00000
Type:	Measured
Suspect Parameter Number:	2467
Reference:	PGN 65,019 SAE J1939-75

SPN 2468 - GENERATOR TOTAL kW HOURS EXPORT—The total kilowatt-hours that have been exported by the generator.

Data Length:	4 bytes
Resolution:	1 kWh/bit, 0 offset
Data Range:	0 to 4211081215 kWh
Type:	Measured
Suspect Parameter Number:	2468
Reference:	PGN 65,018 SAE J1939-75

SPN 2469 - GENERATOR TOTAL kW HOURS IMPORT—The total kilowatt-hours that have been imported by the generator.

Data Length:	4 bytes
Resolution:	1 kWh/bit, 0 offset
Data Range:	0 to 4211081215 kWh
Type:	Measured
Suspect Parameter Number:	2469
Reference:	PGN 65,018 SAE J1939-75

SPN 2470 - UTILITY AVERAGE AC FREQUENCY—Average AC frequency measured at the utility incomer.

Data Length:	2 bytes
Resolution:	1/128 Hz/bit, 0 offset
Data Range:	0 to 501.9921875 Hz
Type:	Measured
Suspect Parameter Number:	2470
Reference:	PGN 65,017 SAE J1939-75

SPN 2471 - UTILITY PHASE A AC FREQUENCY—AC frequency measured at the utility incomer phase A.

Data Length:	2 bytes
Resolution:	1/128 Hz/bit, 0 offset
Data Range:	0 to 501.9921875 Hz
Type:	Measured
Suspect Parameter Number:	2471
Reference:	PGN 65,014 SAE J1939-75

SPN 2472 - UTILITY PHASE B AC FREQUENCY—AC frequency measured at the utility incomer phase B.

Data Length:	2 bytes
Resolution:	1/128 Hz/bit, 0 offset
Data Range:	0 to 501.9921875 Hz
Type:	Measured
Suspect Parameter Number:	2472
Reference:	PGN 65,011 SAE J1939-75

SPN 2473 - UTILITY PHASE C AC FREQUENCY—AC frequency measured at the utility incomer phase C.

Data Length:	2 bytes
Resolution:	1/128 Hz/bit, 0 offset
Data Range:	0 to 501.9921875 Hz
Type:	Measured
Suspect Parameter Number:	2473
Reference:	PGN 65,008 SAE J1939-75

SPN 2474 - UTILITY AVERAGE LINE-LINE AC RMS VOLTAGE—Average Line to Line RMS voltage measured at the utility incomer .

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2474
Reference:	PGN 65,017 SAE J1939-75

SPN 2475 - UTILITY PHASE AB LINE-LINE AC RMS VOLTAGE—Line to Line RMS voltage measured at the utility incomer phase AB.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2475
Reference:	PGN 65,014 SAE J1939-75

SPN 2476 - UTILITY PHASE BC LINE-LINE AC RMS VOLTAGE—Line to Line RMS voltage measured at the utility incomer phase BC.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2476
Reference:	PGN 65,011 SAE J1939-75

SPN 2477 - UTILITY PHASE CA LINE-LINE AC RMS VOLTAGE—Line to Line RMS voltage measured at the utility incomer phase CA.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2477
Reference:	PGN 65,008 SAE J1939-75

SPN 2478 - UTILITY AVERAGE LINE-NEUTRAL AC RMS VOLTAGE—The average Line to Neutral AC RMS voltage measured at the utility incomer .

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2478
Reference:	PGN 65,017 SAE J1939-75

SPN 2479 - UTILITY PHASE A LINE-NEUTRAL AC RMS VOLTAGE—Line to Neutral RMS voltage measured at the utility incomer phase A.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2479
Reference:	PGN 65,014 SAE J1939-75

SPN 2480 - UTILITY PHASE B LINE-NEUTRAL AC RMS VOLTAGE—Line to Neutral RMS voltage measured at the utility incomer phase B.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2480
Reference:	PGN 65,011 SAE J1939-75

SPN 2481 - UTILITY PHASE C LINE-NEUTRAL AC RMS VOLTAGE—Line to Neutral RMS voltage measured at the utility incomer phase C.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2481
Reference:	PGN 65,008 SAE J1939-75

SPN 2482 - UTILITY AVERAGE AC RMS CURRENT—Average RMS current measured at the utility incomer.

Data Length:	2 bytes
Resolution:	1 A/bit, 0 offset
Data Range:	0 to 64,255 Amps
Type:	Measured
Suspect Parameter Number:	2482
Reference:	PGN 65,017 SAE J1939-75

SPN 2483 - UTILITY PHASE A AC RMS CURRENT—RMS current measured at the utility incomer phase A.

Data Length:	2 bytes
Resolution:	1 A/bit, 0 offset
Data Range:	0 to 64,255 Amps
Type:	Measured
Suspect Parameter Number:	2483
Reference:	PGN 65,014 SAE J1939-75

SPN 2484 - UTILITY PHASE B AC RMS CURRENT—RMS current measured at the utility incomer phase B.

Data Length:	2 bytes
Resolution:	1 A/bit, 0 offset
Data Range:	0 to 64,255 Amps
Type:	Measured
Suspect Parameter Number:	2484
Reference:	PGN 65,011 SAE J1939-75

SPN 2485 - UTILITY PHASE C AC RMS CURRENT—RMS current measured at the utility incomer phase C.

Data Length:	2 bytes
Resolution:	1 A/bit, 0 offset
Data Range:	0 to 64,255 Amps
Type:	Measured
Suspect Parameter Number:	2485
Reference:	PGN 65,008 SAE J1939-75

SPN 2486 - UTILITY TOTAL REAL POWER—Total real power delivered by the utility incomer.

Data Length:	4 bytes
Resolution:	1 W/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 Watts
Type:	Measured
Suspect Parameter Number:	2486
Reference:	PGN 65,016 SAE J1939-75

SPN 2487 - UTILITY PHASE A REAL POWER—The real power delivered by phase A of the utility incomer.

Data Length:	4 bytes
Resolution:	1 W/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 Watts
Type:	Measured
Suspect Parameter Number:	2487
Reference:	PGN 65,013 SAE J1939-75

SPN 2488 - UTILITY PHASE B REAL POWER—The real power delivered by phase B of the utility incomer.

Data Length:	4 bytes
Resolution:	1 W/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 Watts
Type:	Measured
Suspect Parameter Number:	2488
Reference:	PGN 65,010 SAE J1939-75

SPN 2489 - UTILITY PHASE C REAL POWER—The real power delivered by phase C of the utility incomer.

Data Length:	4 bytes
Resolution:	1 W/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 Watts
Type:	Measured
Suspect Parameter Number:	2489
Reference:	PGN 65,007 SAE J1939-75

SPN 2490 - UTILITY TOTAL REACTIVE POWER—The total reactive power delivered by the utility incomer

Data Length:	4 bytes
Resolution:	1 VAr/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VAr
Type:	Measured
Suspect Parameter Number:	2490
Reference:	PGN 65,015 SAE J1939-75

SPN 2491 - UTILITY PHASE A REACTIVE POWER—The reactive power delivered by phase A of the utility incomer

Data Length:	4 bytes
Resolution:	1 VAr/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VAr
Type:	Measured
Suspect Parameter Number:	2491
Reference:	PGN 65,012 SAE J1939-75

SPN 2492 - UTILITY PHASE B REACTIVE POWER—The reactive power delivered by phase B of the utility incomer

Data Length:	4 bytes
Resolution:	1 VAr/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VAr
Type:	Measured
Suspect Parameter Number:	2492
Reference:	PGN 65,009 SAE J1939-75

SPN 2493 - UTILITY PHASE C REACTIVE POWER—The reactive power delivered by phase C of the utility incomer

Data Length:	4 bytes
Resolution:	1 VAr/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VAr
Type:	Measured
Suspect Parameter Number:	2493
Reference:	PGN 65,006 SAE J1939-75

SPN 2494 - UTILITY TOTAL APPARENT POWER—The total apparent power delivered by the utility incomer.

Data Length:	4 bytes
Resolution:	1 VA/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VA
Type:	Measured
Suspect Parameter Number:	2494
Reference:	PGN 65,016 SAE J1939-75

SPN 2495 - UTILITY PHASE A APPARENT POWER—The apparent power delivered by phase A of the utility incomer.

Data Length:	4 bytes
Resolution:	1 VA/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VA
Type:	Measured
Suspect Parameter Number:	2495
Reference:	PGN 65,013 SAE J1939-75

SPN 2496 - UTILITY PHASE B APPARENT POWER—The apparent power delivered by phase B of the utility incomer.

Data Length:	4 bytes
Resolution:	1 VA/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VA
Type:	Measured
Suspect Parameter Number:	2496
Reference:	PGN 65,010 SAE J1939-75

SPN 2497 - UTILITY PHASE C APPARENT POWER—The apparent power delivered by phase C of the utility incomer.

Data Length:	4 bytes
Resolution:	1 VA/bit, -2000000000 offset
Data Range:	-2000000000 to +2211081215 VA
Type:	Measured
Suspect Parameter Number:	2497
Reference:	PGN 65,007 SAE J1939-75

SPN 2498 - UTILITY OVERALL POWER FACTOR—The average power factor of the utility incomer.

Data Length:	2 bytes
Resolution:	1/16384 per bit, -1 offset
Data Range:	-1.00000 to 1.00000
Type:	Measured
Suspect Parameter Number:	2498
Reference:	PGN 65,015 SAE J1939-75

SPN 2499 - UTILITY PHASE A POWER FACTOR—The power factor of phase A of the utility incomer.

Data Length:	2 bytes
Resolution:	1/16384 per bit, -1 offset
Data Range:	-1.00000 to 1.00000
Type:	Measured
Suspect Parameter Number:	2499
Reference:	PGN 65,012 SAE J1939-75

SPN 2500 - UTILITY PHASE B POWER FACTOR—The power factor of phases B of the utility incomer.

Data Length:	2 bytes
Resolution:	1/16384 per bit, -1 offset
Data Range:	-1.00000 to 1.00000
Type:	Measured
Suspect Parameter Number:	2500
Reference:	PGN 65,009 SAE J1939-75

SPN 2501 - UTILITY PHASE C POWER FACTOR—The power factor of phases C of the utility incomer.

Data Length:	2 bytes
Resolution:	1/16384 per bit, -1 offset
Data Range:	-1.00000 to 1.00000
Type:	Measured
Suspect Parameter Number:	2501
Reference:	PGN 65,006 SAE J1939-75

SPN 2502 - UTILITY TOTAL kW HOURS EXPORT—The total kilowatt-hours that have been exported by the utility incomer.

Data Length:	4 bytes
Resolution:	1 kWh/bit, 0 offset
Data Range:	0 to 4211081215 kWh
Type:	Measured
Suspect Parameter Number:	2502
Reference:	PGN 65,005 SAE J1939-75

SPN 2503 - UTILITY TOTAL kW HOURS IMPORT—The total kilowatt-hours that have been imported by the utility incomer.

Data Length:	4 bytes
Resolution:	1 kWh/bit, 0 offset
Data Range:	0 to 4211081215 kWh
Type:	Measured
Suspect Parameter Number:	2503
Reference:	PGN 65,005 SAE J1939-75

SPN 2504 - BUS #1 AVERAGE AC FREQUENCY—Average AC frequency measured at bus #1.

Data Length:	2 bytes
Resolution:	1/128 Hz/bit, 0 offset
Data Range:	0 to 501.9921875 Hz
Type:	Measured
Suspect Parameter Number:	2504
Reference:	PGN 65,004 SAE J1939-75

SPN 2505 - BUS #1 PHASE A AC FREQUENCY—AC frequency measured at bus #1 phase A.

Data Length:	2 bytes
Resolution:	1/128 Hz/bit, 0 offset
Data Range:	0 to 501.9921875 Hz
Type:	Measured
Suspect Parameter Number:	2505
Reference:	PGN 65,003 SAE J1939-75

SPN 2506 - BUS #1 PHASE B AC FREQUENCY—AC frequency measured at bus #1 phase B.

Data Length:	2 bytes
Resolution:	1/128 Hz/bit, 0 offset
Data Range:	0 to 501.9921875 Hz
Type:	Measured
Suspect Parameter Number:	2506
Reference:	PGN 65,002 SAE J1939-75

SPN 2507 - BUS #1 PHASE C AC FREQUENCY—AC frequency measured at bus #1 phase C.

Data Length:	2 bytes
Resolution:	1/128 Hz/bit, 0 offset
Data Range:	0 to 501.9921875 Hz
Type:	Measured
Suspect Parameter Number:	2507
Reference:	PGN 65,001 SAE J1939-75

SPN 2508 - BUS #1 AVERAGE LINE-LINE AC RMS VOLTAGE—Average Line to Line RMS voltage measured at bus #1 .

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2508
Reference:	PGN 65,004 SAE J1939-75

SPN 2509 - BUS #1 PHASE AB LINE-LINE AC RMS VOLTAGE—Line to Line RMS voltage measured at bus #1 phase AB.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2509
Reference:	PGN 65,003 SAE J1939-75

SPN 2510 - BUS #1 PHASE BC LINE-LINE AC RMS VOLTAGE—Line to Line RMS voltage measured at bus #1 phase BC.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2510
Reference:	PGN 65,002 SAE J1939-75

SPN 2511 - BUS #1 PHASE CA LINE-LINE AC RMS VOLTAGE—Line to Line RMS voltage measured at bus #1 phase CA.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2511
Reference:	PGN 65,001 SAE J1939-75

SPN 2512 - BUS #1 AVERAGE LINE-NEUTRAL AC RMS VOLTAGE—The average Line to Neutral AC RMS voltage measured at bus #1 .

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2512
Reference:	PGN 65,004 SAE J1939-75

SPN 2513 - BUS #1 PHASE A LINE-NEUTRAL AC RMS VOLTAGE—Line to Neutral RMS voltage measured at bus #1 phase A.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2513
Reference:	PGN 65,003 SAE J1939-75

SPN 2514 - BUS #1 PHASE B LINE-NEUTRAL AC RMS VOLTAGE—Line to Neutral RMS voltage measured at bus #1 phase B.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2514
Reference:	PGN 65,002 SAE J1939-75

SPN 2515 - BUS #1 PHASE C LINE-NEUTRAL AC RMS VOLTAGE—Line to Neutral RMS voltage measured at bus #1 phase C.

Data Length:	2 bytes
Resolution:	1 V/bit, 0 offset
Data Range:	0 to 64,255 Volts
Type:	Measured
Suspect Parameter Number:	2515
Reference:	PGN 65,001 SAE J1939-75

SPN 2516 - BUS #1/GENERATOR AC PHASE DIFFERENCE—The phase difference between the Bus #1 voltage and Generator voltage.

Data Length:	2 bytes
Resolution:	1/128 deg/bit, -200 deg offset
Data Range:	-200 to 301.99 deg
Type:	Status
Suspect Parameter Number:	2516
Reference:	PGN 65,000 SAE J1939-75

SPN 2517 - BUS #1/UTILITY AC PHASE DIFFERENCE—The phase difference between the Bus #1 voltage and Utility voltage.

Data Length:	2 bytes
Resolution:	1/128 deg/bit, -200 deg offset
Data Range:	-200 to 301.99 deg
Type:	Status
Suspect Parameter Number:	2517
Reference:	PGN 64,999 SAE J1939-75

SPN 2518 - GENERATOR OVERALL POWER FACTOR LAGGING—Lead/lag status for generator average power factor.

00 -	Leading
01 -	Lagging
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2518
Reference:	PGN 65,028 SAE J1939-75

SPN 2519 - GENERATOR PHASE A POWER FACTOR LAGGING—Lead/lag status for generator phase A power factor.

00 -	Leading
01 -	Lagging
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2519
Reference:	PGN 65,025 SAE J1939-75

SPN 2520 - GENERATOR PHASE B POWER FACTOR LAGGING—Lead/lag status for generator phase B power factor.

00 -	Leading
01 -	Lagging
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2520
Reference:	PGN 65,022 SAE J1939-75

SPN 2521 - GENERATOR PHASE C POWER FACTOR LAGGING—Lead/lag status for generator phase C power factor.

00 -	Leading
01 -	Lagging
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2521
Reference:	PGN 65,019 SAE J1939-75

SPN 2522 - UTILITY OVERALL POWER FACTOR LAGGING—Lead/lag status for utility incomer average power factor.

00 -	Leading
01 -	Lagging
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2522
Reference:	PGN 65,015 SAE J1939-75

SPN 2523 - UTILITY PHASE A POWER FACTOR LAGGING—Lead/lag status for utility incomer phase A power factor.

00 -	Leading
01 -	Lagging
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2523
Reference:	PGN 65,012 SAE J1939-75

SPN 2524 - UTILITY PHASE B POWER FACTOR LAGGING—Lead/lag status for utility incomer phase B power factor.

00 -	Leading
01 -	Lagging
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2524
Reference:	PGN 65,009 SAE J1939-75

SPN 2525 - UTILITY PHASE C POWER FACTOR LAGGING—Lead/lag status for utility incomer phase C power factor.

00 -	Leading
01 -	Lagging
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2525
Reference:	PGN 65,006 SAE J1939-75

SPN 2526 - BUS #1/GENERATOR PHASE MATCH—Indicator of whether phase difference between Bus #1 and Generator is adequate for paralleling. This indicator will be based on the measured AC phase difference qualified using parameters such as Phase Tolerance and Dwell Time.

00 -	Phases do not match
01 -	Phases match
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2526
Reference:	PGN 65,000 SAE J1939-75

SPN 2527 - BUS #1/GENERATOR VOLTAGE MATCH—Indicator of whether voltage difference between Bus #1 and Generator is adequate for paralleling. This indicator will be based on the measured AC voltages qualified using parameters such as Voltage Tolerance.

00 -	Voltages do not match
01 -	Voltages match
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2527
Reference:	PGN 65,000 SAE J1939-75

SPN 2528 - BUS #1/GENERATOR FREQUENCY MATCH—Indicator of whether frequency difference between Bus #1 and Generator is adequate for paralleling. This indicator will be based on the measured AC frequencies qualified using parameters such as Frequency Tolerance, Phase Tolerance, and Dwell Time.

00 -	Frequencies do not match
01 -	Frequencies match
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2528
Reference:	PGN 65,000 SAE J1939-75

SPN 2529 - BUS #1/GENERATOR IN SYNC—Indicator of whether Bus #1 and Generator are properly synchronized for paralleling. This indicator will be based on parameters such as Voltage Match, Frequency Match, and Phase Match.

00 -	Not synchronized
01 -	Synchronized
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2529
Reference:	PGN 65,000 SAE J1939-75

SPN 2530 - BUS #1/GENERATOR DEAD BUS—Indicator of whether Bus #1 is considered dead for closing to the generator. This indicator will be based on parameters such as Bus #1 Voltage and dead bus threshold values.

00 -	Bus is not dead
01 -	Bus is dead
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2530
Reference:	PGN 65,000 SAE J1939-75

SPN 2531 - BUS #1/UTILITY PHASE MATCH—Indicator of whether phase difference between Bus #1 and Utility is adequate for paralleling. This indicator will be based on the measured AC phase difference qualified using parameters such as Phase Tolerance and Dwell Time.

00 -	Phases do not match
01 -	Phases match
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2531
Reference:	PGN 64,999 SAE J1939-75

SPN 2532 - BUS #1/UTILITY VOLTAGE MATCH—Indicator of whether voltage difference between Bus #1 and Utility is adequate for paralleling. This indicator will be based on the measured AC voltages qualified using parameters such as Voltage Tolerance.

00 -	Voltages do not match
01 -	Voltages match
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2532
Reference:	PGN 64,999 SAE J1939-75

SPN 2533 - BUS #1/UTILITY FREQUENCY MATCH—Indicator of whether frequency difference between Bus #1 and Utility is adequate for paralleling. This indicator will be based on the measured AC frequencies qualified using parameters such as Frequency Tolerance, Phase Tolerance, and Dwell Time.

00 -	Frequencies do not match
01 -	Frequencies match
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2533
Reference:	PGN 64,999 SAE J1939-75

SPN 2534 - BUS #1/UTILITY IN SYNC—Indicator of whether Bus #1 and Utility are properly synchronized for paralleling. This indicator will be based on parameters such as Voltage Match, Frequency Match, and Phase Match.

00 -	Not synchronized
01 -	Synchronized
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2534
Reference:	PGN 64,999 SAE J1939-75

SPN 2535 - BUS #1/UTILITY DEAD BUS—Indicator of whether Bus #1 is considered dead for closing to the utility. This indicator will be based on parameters such as Bus #1 Voltage and dead bus threshold values.

00 -	Bus is not dead
01 -	Bus is dead
10 -	Error
11 -	Not Available or Not Installed
Data Length:	2 bits
Data Range:	0 to 3
Type:	Measured
Suspect Parameter Number:	2535
Reference:	PGN 64,999 SAE J1939-75

5.3 Parameter Group Definitions

The message definitions presented in this section of this document are listed in numerical order by PGN.

PGN 64999 - BUS #1/UTILITY SYNC CHECK STATUS: BUSC

Transmission repetition rate:	100 ms
Data length:	8
Data page:	0
PDU format:	253
PDU specific:	231
Default priority:	3
Parameter group number:	64,999 ($00FDE7_{16}$)

Byte		Bit				
1		8,7	Bus #1/Utility Voltage Match	2532	-75
		6,5	Bus #1/Utility Frequency Match	2533	-75
		4,3	Bus #1/Utility Phase Match	2531	-75
		2,1	Bus #1/Utility Dead Bus	2535	-75
2		8-3	Not defined		
		2,1	Bus #1/Utility In Sync	2534	-75
3-4	Bus #1/Utility AC Phase Difference			2517	-75
5-8	Not defined				

PGN 65000 - BUS #1/GENERATOR SYNC CHECK STATUS: BGSC

Transmission repetition rate: 100 ms
Data length: 8
Data page: 0
PDU format: 253
PDU specific: 232
Default priority: 3
Parameter group number: 65,000 ($00FDE8_{16}$)

Byte:		Bit:			
1		8,7	Bus #1/Generator Voltage Match	2527	-75
		6,5	Bus #1/Generator Frequency Match	2528	-75
		4,3	Bus #1/Generator Phase Match	2526	-75
		2,1	Bus #1/Generator Dead Bus	2530	-75
2		Bit:	8-3 Not defined		
		2,1	Bus #1/Generator In Sync	2529	-75
3-4	Bus #1/Generator AC Phase Difference			2516	-75
5-8	Not defined				

PGN 65001 - BUS #1 PHASE C BASIC AC QUANTITIES: BPCAC

Transmission repetition rate: 100 ms
Data length: 8
Data page: 0
PDU format: 253
PDU specific: 233
Default priority: 3
Parameter group number: 65,001 ($00FDE9_{16}$)

Byte:			
1-2	Bus #1 Phase CA Line-Line AC RMS Voltage	2511	-75
3-4	Bus #1 Phase C Line-Neutral AC RMS Voltage	2515	-75
5-6	Bus #1 Phase C AC Frequency	2507	-75
7-8	Not defined		

PGN 65002 - BUS #1 PHASE B BASIC AC QUANTITIES: BPBAC

Transmission repetition rate: 100 ms
Data length: 8
Data page: 0
PDU format: 253
PDU specific: 234
Default priority: 3
Parameter group number: 65,002 ($00FDEA_{16}$)

Byte:			
1-2	Bus #1 Phase BC Line-Line AC RMS Voltage	2510	-75
3-4	Bus #1 Phase B Line-Neutral AC RMS Voltage	2514	-75
5-6	Bus #1 Phase B AC Frequency	2506	-75
7-8	Not defined		

PGN 65003 - BUS #1 PHASE A BASIC AC QUANTITIES: BPAAC

Transmission repetition rate: 100 ms
Data length: 8
Data page: 0
PDU format: 2538
PDU specific: 235
Default priority: 3
Parameter group number: 65,003 ($00FDEB_{16}$)

Byte:				
1-2	Bus #1 Phase AB Line-Line AC RMS Voltage	2509	-75
3-4	Bus #1 Phase A Line-Neutral AC RMS Voltage	2513	-75
5-6	Bus #1 Phase A AC Frequency	2505	-75
7-8	Not defined		

PGN 65004 - BUS #1 AVERAGE BASIC AC QUANTITIES: BAAC

Transmission repetition rate: 100 ms
Data length: 8
Data page: 0
PDU format: 253
PDU specific: 236
Default priority: 3
Parameter group number: 65,004 ($00FDEC_{16}$)

Byte:				
1-2	Bus #1 Average Line-Line AC RMS Voltage	2508	-75
3-4	Bus #1 Average Line-Neutral AC RMS Voltage	2512	-75
5-6	Bus #1 Average AC Frequency	2504	-75
7-8	Not defined		

PGN 65005 - UTILITY TOTAL AC ENERGY: UTACE

Transmission repetition rate: 100 ms
Data length: 8
Data page: 0
PDU format: 253
PDU specific: 237
Default priority: 3
Parameter group number: 65,005 ($00FDED_{16}$)

Byte:				
1-4	Utility Total kW Hours Export	2502	-75
5-8	Utility Total kW Hours Import	2503	-75

PGN 65006 - UTILITY PHASE C AC REACTIVE POWER: UPCACR

Transmission repetition rate: 100 ms
Data length: 8
Data page: 0
PDU format: 253
PDU specific: 238
Default priority: 3
Parameter group number: 65,006 ($00FDEE_{16}$)

Byte:						
1-4	Utility Phase C Reactive Power				2493	-75
5-6	Utility Phase C Power Factor				2501	-75
7		Bit:	8-3	Not defined		
			2,1	Utility Phase C Power Factor Lagging	2525	-75
8	Not defined					

PGN 65007 - UTILITY PHASE C AC POWER: UPCACP

Transmission repetition rate: 100 ms
Data length: 8
Data page: 0
PDU format: 253
PDU specific: 239
Default priority: 3
Parameter group number: 65,007 ($00FDEF_{16}$)

Byte:				
1-4	Utility Phase C Real Power	2489	-75
5-8	Utility Phase C Apparent Power	2497	-75

PGN 65008 - UTILITY PHASE C AC BASIC QUANTITIES: UPCAC

Transmission repetition rate: 100 ms
Data length: 8
Data page: 0
PDU format: 253
PDU specific: 240
Default priority: 3
Parameter group number: 65,008 ($00FDF0_{16}$)

Byte:			
1-2	Utility Phase CA Line-Line AC RMS Voltage	2477	-75
3-4	Utility Phase C Line-Neutral AC RMS Voltage	2481	-75
5-6	Utility Phase C AC Frequency	2473	-75
7-8	Utility Phase C AC RMS Current	2485	-75