



State of West Virginia
 Department of Administration
 Purchasing Division
 2019 Washington Street East
 Post Office Box 50130
 Charleston, WV 25305-0130

Request for Quotation

RFQ NUMBER:
BPH70348

PAGE:
1

ADDRESS CORRESPONDENCE TO ATTENTION OF:
**ROBERTA WAGNER
 304-558-0067**

RFQ COPY

TYPE NAME/ADDRESS HERE

**ANCO CONSTRUCTION-WV, LLC
 RT. 2 BOX 379
 MARLINTON, WV
 24954**

**HEALTH AND HUMAN RESOURCES
 BPH - TRAUMA & EMERGENCY CARE
 SYSTEM
 VARIOUS LOCALES AS INDICATED
 ON PURCHASE ORDER**

W.V. LICENSE # WV 040311

DATE PRINTED	TERMS OF SALE	SHIP VIA	F.O.B.	FREIGHT TERMS
01/03/2007				

BID OPENING DATE: **02/06/2007** BID OPENING TIME **01:30PM**

LINE	QUANTITY	UOP	CAT NO	ITEM NUMBER	UNIT PRICE	AMOUNT
0001	1	JB		285-39		
<p>OPEN END CONTRACT TO PROVIDE AC POWER GENERATORS</p> <p>OPEN END CONTRACT</p> <p>TO ESTABLISH AN OPEN END CONTRACT FOR VARIOUS STANDBY AC POWER GENERATORS FOR THE STATEWIDE MEDICAL COMMAND MICROWAVE SYSTEM AND INTEROPERABLE RADIO SYSTEM FOR SUBDIVISIONS. THIS CONTRACT WOULD BE FOR PURCHASE OF THE GENERATORS, ACCESSORIES, DELIVERY AND INSTALLATION TO SPECIFIC TOWER SITES AS PER THE ATTACHED SPECIFICATIONS.</p> <p>EXHIBIT 3</p> <p>LIFE OF CONTRACT: THIS CONTRACT BECOMES EFFECTIVE ON AND EXTENDS FOR A PERIOD OF ONE (1) YEAR OR UNTIL SUCH "REASONABLE TIME" THEREAFTER AS IS NECESSARY TO OBTAIN A NEW CONTRACT OR RENEW THE ORIGINAL CONTRACT. THE "REASONABLE TIME" PERIOD SHALL NOT EXCEED TWELVE (12) MONTHS. DURING THIS "REASONABLE TIME" THE VENDOR MAY TERMINATE THIS CONTRACT FOR ANY REASON UPON GIVING THE DIRECTOR OF PURCHASING 30 DAYS WRITTEN NOTICE.</p> <p>UNLESS SPECIFIC PROVISIONS ARE STIPULATED ELSEWHERE IN THIS CONTRACT DOCUMENT, THE TERMS, CONDITIONS AND PRICING SET HEREIN ARE FIRM FOR THE LIFE OF THE CONTRACT.</p> <p>RENEWAL: THIS CONTRACT MAY BE RENEWED UPON THE MUTUAL WRITTEN CONSENT OF THE SPENDING UNIT AND VENDOR, SUBMITTED TO THE DIRECTOR OF PURCHASING THIRTY (30)</p>						

RECEIVED

2007 FEB -6 P 12:55

**PURCHASING DIVISION
 STATE OF WV**

SEE REVERSE SIDE FOR TERMS AND CONDITIONS			
SIGNATURE <i>[Signature]</i>	TELEPHONE 304-744-1098	DATE 2/6/07	
TITLE Member	FEIN	ADDRESS CHANGES TO BE NOTED ABOVE	

WHEN RESPONDING TO RFQ, INSERT NAME AND ADDRESS IN SPACE ABOVE LABELED 'VENDOR'

**GENERAL TERMS & CONDITIONS
REQUEST FOR QUOTATION (RFQ) AND REQUEST FOR PROPOSAL (RFP)**

1. Awards will be made in the best interest of the State of West Virginia.
2. The State may accept or reject in part, or in whole, any bid.
3. All quotations are governed by the *West Virginia Code* and the *Legislative Rules* of the Purchasing Division.
4. Prior to any award, the apparent successful vendor must be properly registered with the Purchasing Division and have paid the required \$125.00 registration fee.
5. All services performed or goods delivered under State Purchase Orders/Contracts are to be continued for the term of the Purchase Order/Contract, contingent upon funds being appropriated by the Legislature or otherwise being made available. In the event funds are not appropriated or otherwise available for these services or goods, this Purchase Order/Contract becomes void and of no effect after June 30.
6. Payment may only be made after the delivery and acceptance of goods or services.
7. Interest may be paid for late payment in accordance with the *West Virginia Code*.
8. Vendor preference will be granted upon written request in accordance with the *West Virginia Code*.
9. The State of West Virginia is exempt from federal and state taxes and will not pay or reimburse such taxes.
10. The Director of Purchasing may cancel any Purchase Order/Contract upon 30 days written notice to the seller.
11. The laws of the State of West Virginia and the *Legislative Rules* of the Purchasing Division shall govern all rights and duties under the Contract, including without limitation the validity of this Purchase Order/Contract.
12. Any reference to automatic renewal is hereby deleted. The Contract may be renewed only upon mutual written agreement of the parties.
13. **BANKRUPTCY:** In the event the vendor/contractor files for bankruptcy protection, this contract is automatically null and void, and is terminated without further order.
14. **HIPAA Business Associate Addendum** - The West Virginia State Government HIPAA Business Associate Addendum (BAA), approved by the Attorney General, and available online at the Purchasing Division's web site (<http://www.state.wv.us/admin/purchase/vrc/hipaa.htm>) is hereby made part of the agreement. Provided that, the Agency meets the definition of a Covered Entity (45 CFR §160.103) and will be disclosing Protected Health Information (45 CFR §160.103) to the vendor.

INSTRUCTIONS TO BIDDERS

1. Use the quotation forms provided by the Purchasing Division.
2. **SPECIFICATIONS:** Items offered must be in compliance with the specifications. Any deviation from the specifications must be clearly indicated by the bidder. Alternates offered by the bidder as **EQUAL** to the specifications must be clearly defined. A bidder offering an alternate should attach complete specifications and literature to the bid. The Purchasing Division may waive minor deviations to specifications.
3. Complete all sections of the quotation form.
4. Unit prices shall prevail in cases of discrepancy.
5. All quotations are considered F.O.B. destination unless alternate shipping terms are clearly identified in the quotation.
6. **BID SUBMISSION:** All quotations must be delivered by the bidder to the office listed below prior to the date and time of the bid opening. Failure of the bidder to deliver the quotations on time will result in bid disqualifications.

SIGNED BID TO:

Department of Administration
Purchasing Division
2019 Washington Street East
Post Office Box 50130
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<p>DAYS PRIOR TO THE EXPIRATION DATE. SUCH RENEWAL SHALL BE IN ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE ORIGINAL CONTRACT AND SHALL BE LIMITED TO TWO (2) ONE (1) YEAR PERIODS.</p> <p>CANCELLATION: THE DIRECTOR OF PURCHASING RESERVES THE RIGHT TO CANCEL THIS CONTRACT IMMEDIATELY UPON WRITTEN NOTICE TO THE VENDOR IF THE COMMODITIES AND/OR SERVICES SUPPLIED ARE OF AN INFERIOR QUALITY OR DO NOT CONFORM TO THE SPECIFICATIONS OF THE BID AND CONTRACT HEREIN.</p> <p>OPEN MARKET CLAUSE: THE DIRECTOR OF PURCHASING MAY AUTHORIZE A SPENDING UNIT TO PURCHASE ON THE OPEN MARKET, WITHOUT THE FILING OF A REQUISITION OR COST ESTIMATE, ITEMS SPECIFIED ON THIS CONTRACT FOR IMMEDIATE DELIVERY IN EMERGENCIES DUE TO UNFORESEEN CAUSES (INCLUDING BUT NOT LIMITED TO DELAYS IN TRANSPORTATION OR AN UNANTICIPATED INCREASE IN THE VOLUME OF WORK.)</p> <p>QUANTITIES: QUANTITIES LISTED IN THE REQUISITION ARE APPROXIMATIONS ONLY, BASED ON ESTIMATES SUPPLIED BY THE STATE SPENDING UNIT. IT IS UNDERSTOOD AND AGREED THAT THE CONTRACT SHALL COVER THE QUANTITIES ACTUALLY ORDERED FOR DELIVERY DURING THE TERM OF THE CONTRACT, WHETHER MORE OR LESS THAN THE QUANTITIES SHOWN.</p> <p>ORDERING PROCEDURE: SPENDING UNIT(S) SHALL ISSUE A WRITTEN STATE CONTRACT ORDER (FORM NUMBER WV-39) TO THE VENDOR FOR COMMODITIES COVERED BY THIS CONTRACT. THE ORIGINAL COPY OF THE WV-39 SHALL BE MAILED TO THE VENDOR AS AUTHORIZATION FOR SHIPMENT, A SECOND COPY MAILED TO THE PURCHASING DIVISION, AND A THIRD COPY RETAINED BY THE SPENDING UNIT.</p> <p>BANKRUPTCY: IN THE EVENT THE VENDOR/CONTRACTOR FILES</p>						

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<p>FOR BANKRUPTCY PROTECTION, THIS CONTRACT IS AUTOMATICALLY NULL AND VOID, AND IS TERMINATED WITHOUT FURTHER ORDER.</p> <p>THE TERMS AND CONDITIONS CONTAINED IN THIS CONTRACT SHALL SUPERSEDE ANY AND ALL SUBSEQUENT TERMS AND CONDITIONS WHICH MAY APPEAR ON ANY ATTACHED PRINTED DOCUMENTS SUCH AS PRICE LISTS, ORDER FORMS, SALES AGREEMENTS OR MAINTENANCE AGREEMENTS, INCLUDING ANY ELECTRONIC MEDIUM SUCH AS CD-ROM.</p> <p>REV. 04/11/2001</p> <p>WRITTEN QUESTIONS SHALL BE ACCEPTED THROUGH CLOSE OF BUSINESS ON FRIDAY, 1/12/07. QUESTIONS MAY BE SENT VIA USPS, FAX, COURIER OR EMAIL. IN ORDER TO ASSURE NO VENDOR RECEIVES AN UNFAIR ADVANTAGE, NO SUBSTANTIVE QUESTIONS WILL BE ANSWERED ORALLY. IF POSSIBLE, EMAIL QUESTIONS ARE PREFERRED. ADDRESS INQUIRIES TO:</p> <p>ROBERTA WAGNER DEPARTMENT OF ADMINISTRATION PURCHASING DIVISION 2019 WASHINGTON STREET, EAST CHARLESTON, WV 25311 FAX: 304-558-4115 EMAIL: RWAGNER@WVADMIN.GOV</p> <p>EXHIBIT 6</p> <p>PRICE ADJUSTMENT PROVISION: THE STATE OF WEST VIRGINIA WILL CONSIDER BIDS THAT CONTAIN PROVISIONS FOR PRICE ADJUSTMENTS PRIOR TO THE ORIGINAL EXPIRATION OF THE CONTRACT, PROVIDED THAT SUCH</p>						

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<p>PRICE ADJUSTMENT COVERS BOTH UPWARD AND DOWNWARD MOVEMENT OF THE COMMODITY PRICE, AND THAT ADJUSTMENT IS BASED ON THE "PASS THROUGH" INCREASE OR DECREASE OF RAW MATERIALS AND/OR LABOR, WHICH MAKE UP ALL OR A SUBSTANTIAL PART OF A PRODUCT. ADJUSTMENTS ARE TO BE BASED UPON AN ACTUAL DOLLAR FIGURE, NOT A PERCENTAGE. ALL PRICE ADJUSTMENT REQUESTS MUST BE SUBSTANTIATED IN A MANNER ACCEPTABLE TO THE DIRECTOR PURCHASING, E.G. GOVERNMENTAL BENCH MARKS, GENERAL MARKET INCREASE, PUBLISHED PRICE LISTS. SUCH REQUESTS FOR AND INCREASE SHOULD BE RECEIVED IN WRITING BY THE DIRECTOR OF PURCHASING AT LEAST 30 DAYS IN ADVANCE OF THE EFFECTIV DATE OF THE INCREASE. ANY TIME THE VENDOR REQUESTS A PRICE ADJUSTMENT, THE PURCHASING DIVISION MAY EITHER ACCEPT THE PRICE ADJUSTMENT AND AMEND THE CONTRACT ACCORDINGLY OR REJECT THE ADJUSTMENT IN ITS ENTIRETY AND CANCEL THE CONTRACT.</p> <p>PREFERRED TERMS: IT IS PREFERRED THAT THE PRICES ON THIS CONTRACT ARE FIRM FOR LIFE OF THE CONTRACT, AS INDICATED IN THE LIFE OF CONTRACT CLAUSE CONTAINED HEREIN, NOT TO EXCEED ONE (1) YEAR.</p> <p>IF THE VENDOR CANNOT GUARANTEE A FIRM PRICE FOR THE LIFE OF CONTRACT, HE MUST INDICATE ONE OF THE PARAGRAPHS LISTED BELOW. FAILURE TO QUALIFY THE PREFERRED TERMS WILL BIND THE VENDOR TO A FIRM PRICE FOR THE LIFE OF THE CONTRACT.</p> <p>ALTERNATE TERMS: (X) THE PRICES ON THIS CONTRACT WILL REMAIN FIRM FOR .365... DAYS AFTER THE EFFECTIVE DATE OF THE</p>						

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<p>CONTRACT. PRICES WILL REMAIN FIRM AFTER EACH PRICE ADJUSTMENT FOR A MINIMUM OF DAYS.</p> <p>() THE VENDOR DOES NOT AGREE TO MAINTAIN A FIRM PRICE FOR THE LENGTH OF THE CONTRACT BUT OFFERS AN ALTERNATE PROPOSAL AS FOLLOWS:</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>.....</p> <p>VENDOR PREFERENCE CERTIFICATE</p> <p>CERTIFICATION AND APPLICATION* IS HEREBY MADE FOR PREFERENCE IN ACCORDANCE WITH WEST VIRGINIA CODE, 5A-3-37 (DOES NOT APPLY TO CONSTRUCTION CONTRACTS).</p> <p>A. APPLICATION IS MADE FOR 2.5% PREFERENCE FOR THE REASON CHECKED:</p> <p>() BIDDER IS AN INDIVIDUAL RESIDENT VENDOR AND HAS RESIDED CONTINUOUSLY IN WEST VIRGINIA FOR FOUR (4) YEARS IMMEDIATELY PRECEDING THE DATE OF THIS CERTIFICATION; OR</p> <p>(X) BIDDER IS A PARTNERSHIP, ASSOCIATION OR CORPORATION RESIDENT VENDOR AND HAS MAINTAINED ITS HEAD-QUARTERS OR PRINCIPAL PLACE OF BUSINESS CONTINUOUSLY IN WEST VIRGINIA FOR FOUR (4) YEARS IMMEDIATELY PRECEDING THE DATE OF THIS CERTIFICATION; OR 80% OF THE OWNERSHIP INTEREST OF BIDDER IS HELD BY ANOTHER INDIVIDUAL, PARTNERSHIP, ASSOCIATION OR CORPORATION RESIDENT VENDOR WHO HAS MAINTAINED ITS HEADQUARTERS OR PRINCIPAL PLACE OF BUSINESS CONTINUOUSLY IN WEST VIRGINIA FOR FOUR (4) YEARS IMMEDIATELY PRECEDING THE DATE OF THIS CERTIFICATION; OR</p>						

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<p>() BIDDER IS A CORPORATION NONRESIDENT VENDOR WHICH HAS AN AFFILIATE OR SUBSIDIARY WHICH EMPLOYS A MINIMUM OF ONE HUNDRED STATE RESIDENTS AND WHICH HAS MAINTAINED ITS HEADQUARTERS OR PRINCIPAL PLACE OF BUSINESS WITHIN WEST VIRGINIA CONTINUOUSLY FOR THE FOUR (4) YEARS IMMEDIATELY PRECEDING THE DATE OF THIS CERTIFICATION.</p> <p>B. APPLICATION IS MADE FOR 2.5% PREFERENCE FOR THE REASON CHECKED:</p> <p>(X) BIDDER IS A RESIDENT VENDOR WHO CERTIFIES THAT, DURING THE LIFE OF THE CONTRACT, ON AVERAGE AT LEAST 75% OF THE EMPLOYEES WORKING ON THE PROJECT BEING BID ARE RESIDENTS OF WEST VIRGINIA WHO HAVE RESIDED IN THE STATE CONTINUOUSLY FOR THE TWO YEARS IMMEDIATELY PRECEDING SUBMISSION OF THIS BID;</p> <p>OR</p> <p>() BIDDER IS A NONRESIDENT VENDOR EMPLOYING A MINIMUM OF ONE HUNDRED STATE RESIDENTS OR IS A NONRESIDENT VENDOR WITH AN AFFILIATE OR SUBSIDIARY WHICH MAINTAINS ITS HEADQUARTERS OR PRINCIPAL PLACE OF BUSINESS WITHIN WEST VIRGINIA EMPLOYING A MINIMUM OF ONE HUNDRED STATE RESIDENTS WHO CERTIFIES THAT, DURING THE LIFE OF THE CONTRACT, ON AVERAGE AT LEAST 75% OF THE EMPLOYEES OR BIDDERS' AFFILIATE'S OR SUBSIDIARY'S EMPLOYEES ARE RESIDENTS OF WEST VIRGINIA WHO HAVE RESIDED IN THE STATE CONTINUOUSLY FOR THE TWO YEARS IMMEDIATELY PRECEDING SUBMISSION OF THIS BID.</p> <p>BIDDER UNDERSTANDS IF THE SECRETARY OF TAX & REVENUE DETERMINES THAT A BIDDER RECEIVING PREFERENCE HAS FAILED TO CONTINUE TO MEET THE REQUIREMENTS FOR SUCH PREFERENCE, THE SECRETARY MAY ORDER THE DIRECTOR OF PURCHASING TO: (A) RESCIND THE CONTRACT OR PURCHASE ORDER ISSUED; OR (B) ASSESS A PENALTY AGAINST SUCH</p>						

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<p>BIDDER IN AN AMOUNT NOT TO EXCEED 5% OF THE BID AMOUNT AND THAT SUCH PENALTY WILL BE PAID TO THE CONTRACTING AGENCY OR DEDUCTED FROM ANY UNPAID BALANCE ON THE CONTRACT OR PURCHASE ORDER.</p> <p>BY SUBMISSION OF THIS CERTIFICATE, BIDDER AGREES TO DISCLOSE ANY REASONABLY REQUESTED INFORMATION TO THE PURCHASING DIVISION AND AUTHORIZES THE DEPARTMENT OF TAX AND REVENUE TO DISCLOSE TO THE DIRECTOR OF PURCHASING APPROPRIATE INFORMATION VERIFYING THAT BIDDER HAS PAID THE REQUIRED BUSINESS TAXES, PROVIDED THAT SUCH INFORMATION DOES NOT CONTAIN THE AMOUNTS OF TAXES PAID NOR ANY OTHER INFORMATION DEEMED BY THE TAX COMMISSIONER TO BE CONFIDENTIAL.</p> <p>UNDER PENALTY OF LAW FOR FALSE SWEARING (WEST VIRGINIA CODE 61-5-3), BIDDER HEREBY CERTIFIES THAT THIS CERTIFICATE IS TRUE AND ACCURATE IN ALL RESPECTS; AND THAT IF A CONTRACT IS ISSUED TO BIDDER AND IF ANYTHING CONTAINED WITHIN THIS CERTIFICATE CHANGES DURING THE TERM OF THE CONTRACT, BIDDER WILL NOTIFY THE PURCHASING DIVISION IN WRITING IMMEDIATELY.</p> <p>BIDDER: <u>Anco Construction - WV, LLC</u></p> <p>DATE: <u>2/6/07</u></p> <p>SIGNED: <u>[Signature]</u></p> <p>TITLE: <u>Member</u></p> <p>* CHECK ANY COMBINATION OF PREFERENCE CONSIDERATION(S)</p>						

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<p>IN EITHER "A" OR "B", OR BOTH "A" AND "B" WHICH YOU ARE ENTITLED TO RECEIVE. YOU MAY REQUEST UP TO THE MAXIMUM 5% PREFERENCE FOR BOTH "A" AND "B". (REV. 12/00)</p> <p>NOTICE</p> <p>AN ORIGINAL, SIGNED BID MUST BE SUBMITTED TO:</p> <p>DEPARTMENT OF ADMINISTRATION PURCHASING DIVISION BUILDING 15 2019 WASHINGTON STREET, EAST CHARLESTON, WV 25305-0130</p> <p>THE BID SHOULD CONTAIN THIS INFORMATION ON THE FACE OF THE ENVELOPE OR THE BID MAY NOT BE CONSIDERED: SEALED BID.</p> <p>BUYER: ROBERTA WAGNER - 22</p> <p>RFQ. NO.: BPH70348</p> <p>BID OPENING DATE AND TIME: 02/06/2007 @ 1:30 PM</p> <p>PLEASE PROVIDE A FAX NUMBER IN CASE IT IS NECESSARY TO CONTACT YOU REGARDING YOUR BID: <u>304-744-1098</u></p> <p>CONTACT PERSON (PLEASE PRINT CLEARLY): <u>G. GARY HISSOM</u></p>						

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<p>** PLEASE ENCLOSE A CONVENIENCE COPY **</p> <p>***** THIS IS THE END OF RFQ BPH70348 ***** TOTAL: _____</p> <p>EXHIBIT 4</p> <p>LOCAL GOVERNMENT BODIES: UNLESS THE VENDOR INDICATES IN THE BID HIS REFUSAL TO EXTEND THE PRICES, TERMS, AND CONDITIONS OF THE BID TO COUNTY, SCHOOL, MUNICIPAL AND OTHER LOCAL GOVERNMENT BODIES, THE BID SHALL EXTEND TO POLITICAL SUBDIVISIONS OF THE STATE OF WEST VIRGINIA. IF THE VENDOR DOES NOT WISH TO EXTEND THE PRICES, TERMS, AND CONDITIONS OF THE BID TO ALL POLITICAL SUBDIVISIONS OF THE STATE, THE VENDOR MUST CLEARLY INDICATE SUCH REFUSAL IN HIS BID. SUCH REFUSAL SHALL NOT PREJUDICE THE AWARD OF THIS CONTRACT IN ANY MANNER.</p> <p>REV. 3/88</p>						

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The West Virginia Department of Health and Human Resources (DHHR), Bureau for Public Health (BPH), State Trauma and Emergency Care System (STECS) desires to establish an open-end contract for the purchase of various **standby AC power generators** for the Statewide Medical Command communications and interoperable radio system as well as all state agencies and political subdivisions.

SPECIFICATIONS

1.0 General

- 1.1 Quoted price for each generator shall include delivery and installation of generator unit onto concrete pad at specified tower sites through out West Virginia. Vendor shall include in quote all materials, delivery, and installation costs including, automatic transfer switch, connection of generator to transfer switch with appropriate conduit and wiring, as well as start-up test of generator.
- 1.2 Quote shall be valid for a period of one year, with option to renew for two (2) additional one year periods.
- 1.3 All generator units must meet applicable UL, NFPA, ISA, IEC, CSA, and OSHA guarding, standards.
- 1.4 Successful bidder must be able to provide parts and maintenance for the units quoted.
- 1.5 Units quoted must have a minimum warranty on parts and labor of one (1) year.
- 1.6 Bidder to include copy of unit specifications to confirm compliance with bid specifications.

2.0 Mandatory Engine features

- 2.1 Liquid Propane (LP) fuel system
- 2.2 Heavy duty 4 cycle engine
- 2.3 Electronic distributorless ignition system
- 2.4 Liquid cooled
- 2.5 Electronic governor
- 2.6 12 volt DC electrical starting system
- 2.7 Twist-on full flow cartridge oil filter
- 2.8 Dry Air cleaner with disposable element
- 2.9 Low oil pressure shutdown
- 2.10 Low coolant level shutdown
- 2.11 High coolant temperature shutdown
- 2.12 Easily accessible coolant and oil drains piped to edge of base

3.0 Mandatory Electrical Unit Features

- 3.1** Auto remote starting and stopping
- 3.2** Precise frequency and voltage regulation
- 3.3** Random voltage regulation of +/- 1%
- 3.4** Single phase 120/240 volts AC output
- 3.5** Gas pressure regulator
- 3.6** Radiator and cooling fan with guards
- 3.7** Volts adjust potentiometer
- 3.8** Safety shutdown and alarm indicators
- 3.9** Engine and generator instrumentation
- 3.10** Audible alarms for all faults
- 3.11** Auto start control panel

4.0 Mandatory Additional required features

- 4.1** Weather protective enclosure with anticorrosive heavy duty weather resistant paint
- 4.2** Skid base with vibration isolation
- 4.3** Engine coolant/oil heater
- 4.4** Remote monitoring and auto start functions
- 4.5** Must include operation and maintenance manual with wiring diagrams
- 4.6** Automatic transfer switch shall be inclusive within the price quoted for each generator.

5.0 Size and type of generator units

5.1 The following size generator units are being requested.

- a. 10 kW
- b. 15 kW
- c. 20 kW
- d. 30 kW
- e. 35 kW
- f. 45 kW
- g. 60 Kw

5.2 The ratings in item 5.1 are for "Standby" power as defined in ISO8528 and ISO 3046. Individual unit ratings may be +/- 2 kW, except 60 Kw unit may be +/- 5 Kw.

6.0 Bid Evaluation Sheet

Bid will be evaluated based on the Grand Total Price listed below. Award will be based on the lowest Grand Total Price which meets all specifications in items 1.0 through 5.0.

Note: Vendors should take particular note of the specifications in General Section 1.0 to assure compliance.

Qty	Size	Description	Unit Price	Total Price
2	10 kW	LP Generator	9,228.00	18,456.00
6	15 kW	LP Generator	13,657.00	81,942.00
4	20 kW	LP Generator	17,340.00	69,360.00
2	30 kW	LP Generator	18,109.00	36,218.00
2	35 kW	LP Generator	21,952.00	43,904.00
1	45 kW	LP Generator	24,027.00	24,027.00
1	60 kW	LP Generator	27,638.00	27,638.00
GRAND TOTAL OF BID PRICE				301,545.00

Above quantities are for sample purposes only. Actual ordered amounts may be more or less.

END OF SPECIFICATIONS



ELECTRICIAN LICENSE
MASTER

G. GARY HISSOM

NAME

2225 SMITH RD

STREET & NUMBER

CHARLESTON, WV 25314

CITY, STATE, ZIP

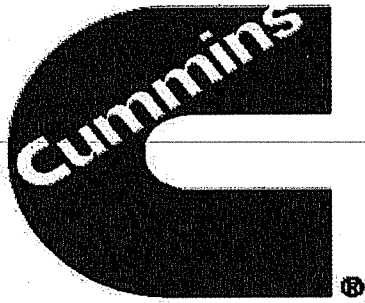
M07295
LICENSE NUMBER

5/18/2006
DATE ISSUED

EXPIRATION DATE

6/30/2007 0:00:00

Sterling Lewis, Jr.
Fire Marshal



Crosspoint

CHARLESTON BRANCH

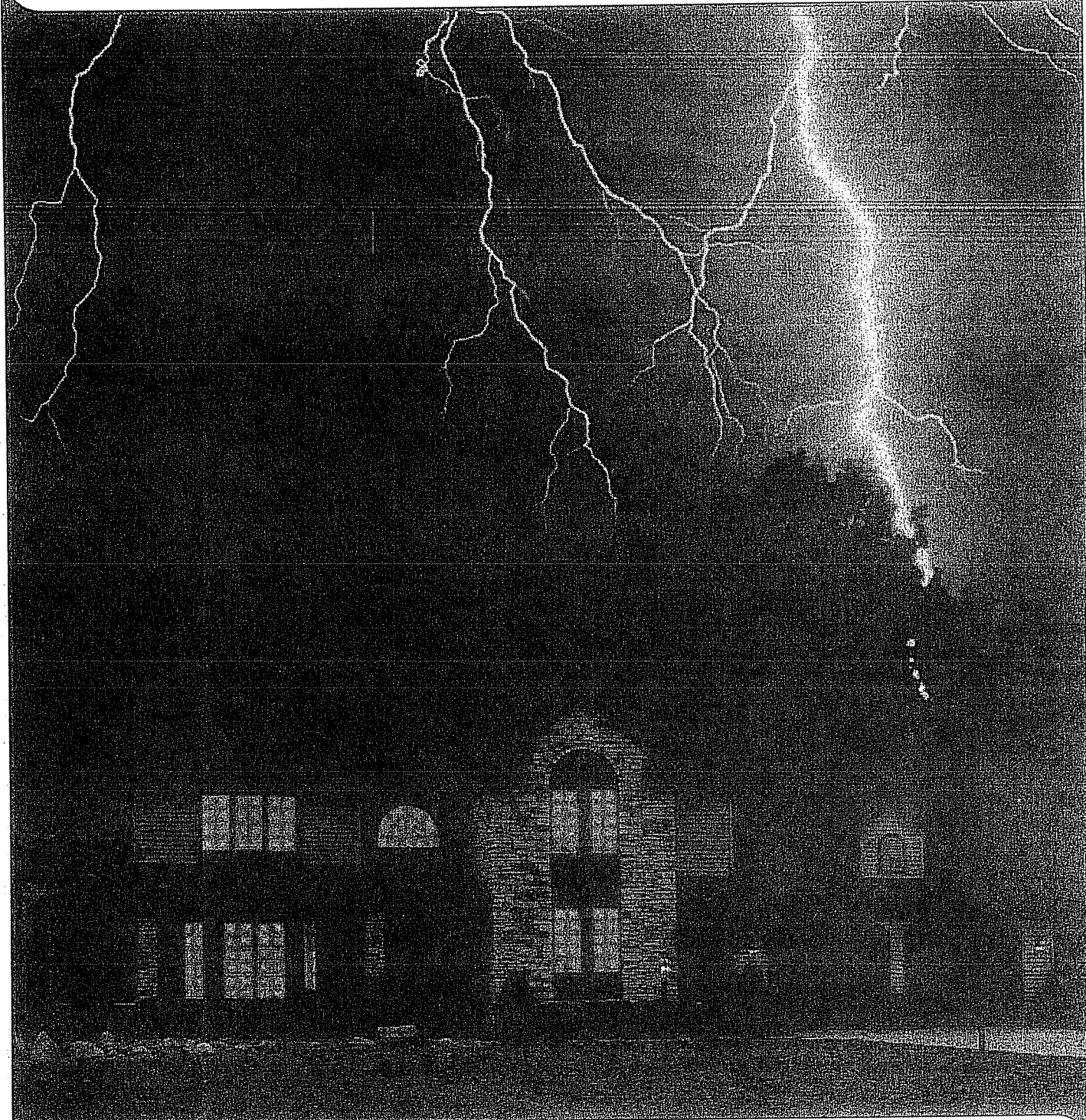
Attn: Rodney B. Hurd

P.O. Box 8456

South Charleston, West Virginia 25303

SENTRY-PRO STAND BY GENERATORS

"WE KEEP YOUR POWER ON"



SENTRY-PRO EMERGENCY STANDBY POWER SYSTEMS by GILLETTE
GIVES YOU 24 HOUR PROTECTION NO MATTER WHEN TROUBLE STRIKES.
YOU CAN'T PREDICT "BLACKOUTS" BUT YOU CAN PREPARE FOR THEM.

SENTRY-PRO®

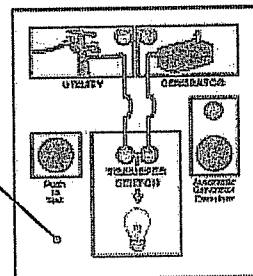
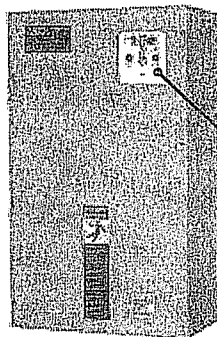
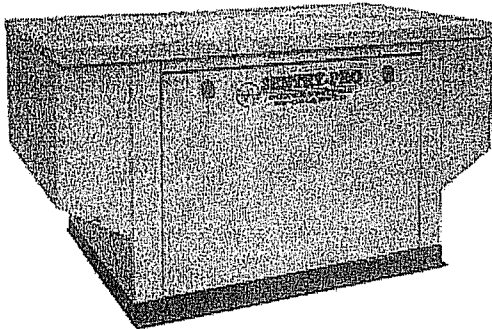
3600 RPM

by Gillette

YOUR OWN "SENTRY" WILL GUARD YOUR FAMILY OR YOUR BUSINESS PROPERTY AGAINST NORMAL UTILITY POWER FAILURE

THE STORM IS ON — THE POWER IS GONE — BUT YOU'RE STILL ON — WITH YOUR OWN EMERGENCY ELECTRIC POWER SYSTEM.

SENTRY-PRO® "PACKAGED STANDBY SETS" includes generator and transfer switch



"SP4 SERIES" PACKAGED ELECTRIC POWER PLANTS

A selection of 8, 10, 12 or 15 KW generators with a choice of natural gas, LPG, or diesel fuel, is all you will need for your home or small business power standby protection.

100 AMP AUTOMATIC TRANSFER SWITCH

Door panel allows complete control functions without ever opening the door to live electric power. (See above control panel inset).

THE EASY WAY TO PROVIDE SECURITY AND PEACE OF MIND FOR YOUR HOME AND FAMILY

Storms, power line faults and even over-loaded electric grids can happen anytime, disrupting utility power to our home or small business.

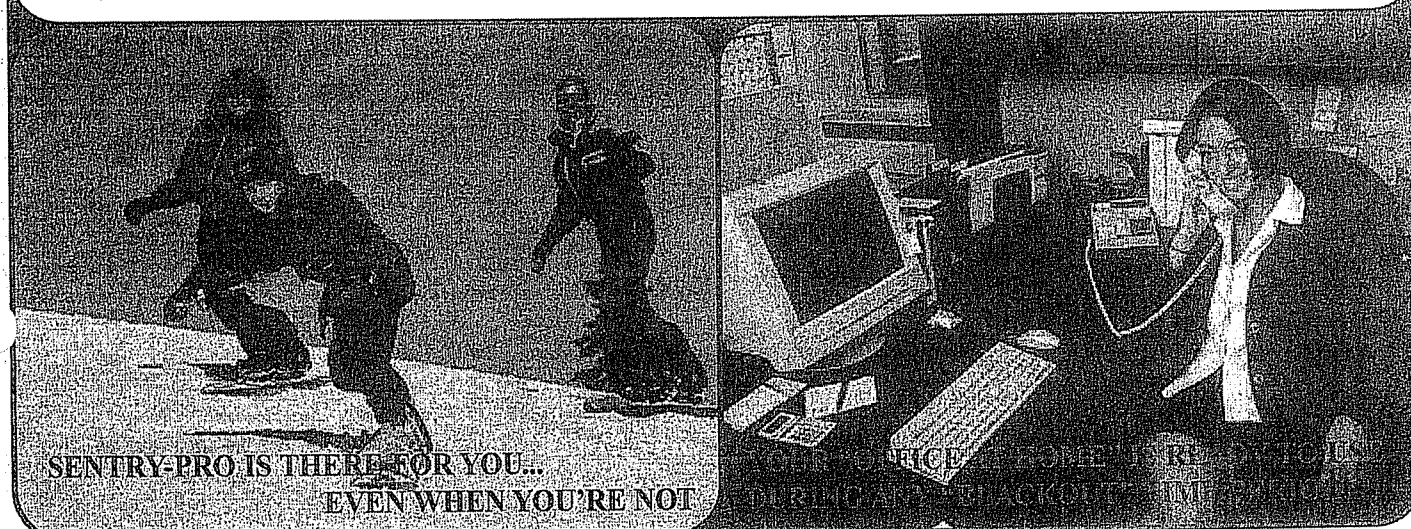
With standby emergency electric power, your family stays warm. Refrigerators, freezers, lights, TV sets, sump pumps or water pumps keep on working. Office equipment, communications and security systems are also vital to remain on line and operating.

Whatever the utility power loss reason and whatever the season, the Gillette "SENTRY-PRO" emergency electric power system is there for you, ready to deliver dependable and clean emergency electric power.

HOW DOES SENTRY-PRO WORK? A microprocessor, digital controller continuously monitors utility power. When the normal power fails, this controller turns the generator on. When normal power returns, the generator shuts itself down. The best part; it's all automatic, with no operator needed.

An automatic engine exerciser is part of the system. It's job is to automatically start and run the engine for 15 minutes, each week. This "exercising" will insure a perfectly operating generator set, when you need it most.

SENTRY-PRO will work on one of (3) fuels: Natural gas, LPG, or diesel fuel.



SENTRY-PRO IS THERE FOR YOU... EVEN WHEN YOU'RE NOT

FOR MORE INFORMATION, CALL 1-800-368-3636

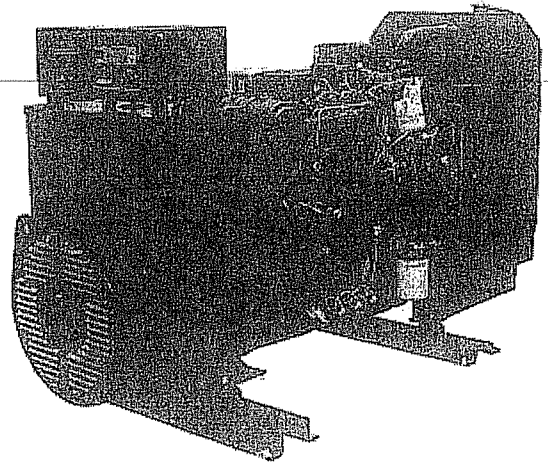
SENTRY-PRO®

1800 RPM by Gillette

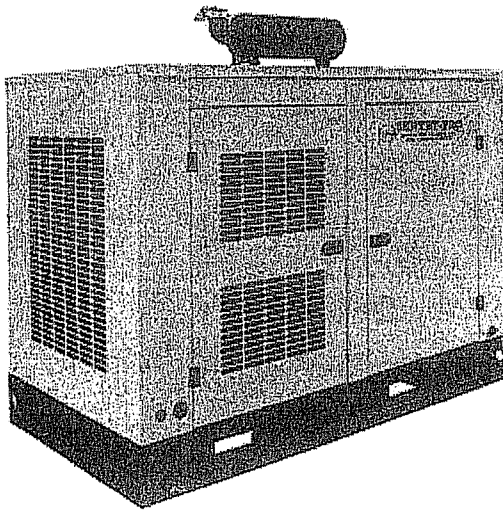
HEAVY DUTY STANDBY GENERATOR SETS READY TO USE
WHENEVER UTILITY POWER IS COMPLETELY LOST.
YOU CAN'T PREDICT — YOU CAN PREPARE

OPEN GENERATOR SETS

- These generator sets are open (no enclosure) and are to be installed in weather protected and uninhabited buildings.
- **EXHAUST SILENCER** and **EXHAUST FLEX PIPE** are furnished loose for installation by others.
- **VIBRATION ISOLATORS** furnished on all sets for quieter, smoother operation.
- **"KLEEN-POWER"®** is achieved on all sets by special circuitry, allowing only 3-4% harmful harmonic waveform distortions.
- **SENTINEL I®** digital controller has (47) diagnostic displays and is programmable for custom applications.
- Open or enclosed sets are available in natural gas, LPG, or diesel fuel, in sizes 15 thru 125KW (dry fuel) and up to 300KW (diesel).



SHOWN IS MODEL SPD-460, 46 KW GENERATOR SET.



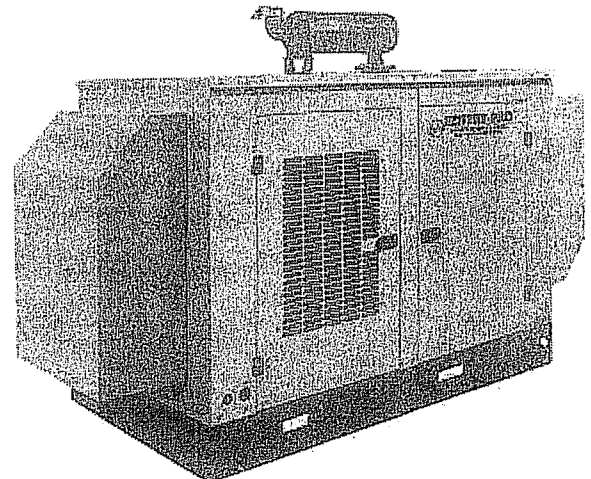
SHOWN IS MODEL SP-650, 65 KW GENERATOR SET.

STANDARD ENCLOSURE

- **STANDARD** housing is weather protected, with sound deadening foam, and has mounted and plumbed exhaust silencer.
- **REVOLVING FIELD** generator design with automatic voltage regulator, allows just 1/2% voltage regulation.
- **ENGINES** are fully equipped with all necessary items and are factory load tested with their specific fuels: natural gas, LPG gas, or diesel.
- **STEEL BASE** wraps around all enclosed sets and provides protection for housing.
- **DIGITAL METERING** on all sets, for volts, amps, frequency, coolant temp., oil pressure, runtime meter, battery voltage, active power (watts) and reactive power (volt-amps)
- **HOUSINGS** are all weather protected and lockable, allowing only authorized entrance.

"SUPER-SILENT" ENCLOSURE

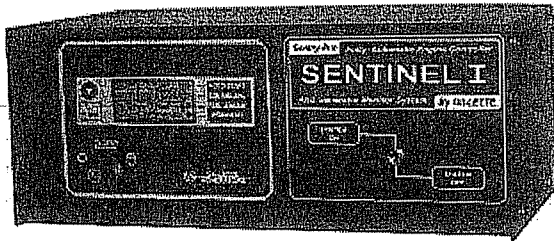
- **SUPER-SILENT** housing is weather protected with special "RESIDENTIAL" silencer, plus special formulated sound absorbing foam and air baffles for ultra-quiet performance.
- **AUTOMATIC ENGINE PROTECTION** on all sets, by automatically shutting down for low oil pressure, high coolant temperature, engine overspeed and overcrank. Automatic starting allows up to (9) individual starting attempts before final shutdown.
- **SELECTOR SWITCH** allows "MANUAL", "AUTOMATIC" and "MAINTENANCE-OFF" positions, on all gen-sets.
- **EFFICIENT** engines run on clean dependable LPG, natural gas or diesel fuel. All engines conform to EPA clean exhaust emissions.
- **UL CERTIFIED** automatic transfer switch and generator, completes the package of the home or business standby generator set.



SHOWN IS MODEL SPD-1000, 100 KW GENERATOR SET.

FEATURES AND BENEFITS OF HOME (3600 RPM) AND COMMERCIAL (1800 RPM) STANDBY SETS

SENTINEL I® MICROPROCESSOR

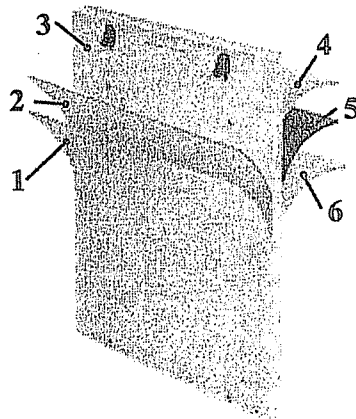


1. Switch for "STOP", "STANDBY" and "MANUAL" positions.
2. Flashing red light or audible signal for shutdown.
3. Pushbutton to scroll display.
4. LED display screen.
5. Special function items with arrow indicator upon failure.
6. System "ON" and "OFF" selector switch.

This digital controller is installed on all commercial 1800 rpm sets and allows greater reliability and accuracy in the control of your standby set. It can automatically start and stop the engine, indicate the operational status and fault conditions, automatically shutting down the engine and indicating the cause of failure on the LCD display and flashing red light. This controller is programmable and can report up to (47) different functions.

SENTINEL II is an option that has all the above features plus it has a full telemetry communication system for total reporting and remote control from any world-wide location.

HOUSING RUST AND SOUND PROOFING SYSTEM



1. Primary baked-on powder coat finish.
2. Secondary cleaning and primer coat.
3. Rust-free "GALVANEEL" steel housing.
4. 3/4" thick sound absorbing foam.
5. Sound vibration damping sheet.
6. Additional foam and sound barrier sheet for "SUPER-SILENT" housing only.

STANDARD HOUSING should be chosen where weather protection and average sound deadening is required, such as factories, industrial sites or remote areas away from general public or residential neighborhoods.

"**SUPER-SILENT**" housings should be chosen for nursing homes or hospitals, within residential areas, within general public congregating areas, or where lowest operating noise is required.

● **GENERATORS** are all of brushless, revolving field design, with single ball bearing. Commercial (1800 rpm) sets have automatic voltage regulators, yielding 1/2% regulation..

● **SENTINEL I®** microprocessor controller has (47) diagnostic displays and is programmable for custom applications. (1800 rpm only).

● **DIGITAL DISPLAY METERING** for volts, amps, frequency, coolant temp., oil pressure, runtime hours, battery voltage, active power (watts) and reactive power (volt-amps) (1800 rpm only).

● **AUTOMATIC ENGINE PROTECTION** by shutting down engine for low oil, high temp., overspeed, overcrank and allows up to (9) engine cranking attempts before final shut-down.

● "**KLEEN-POWER®**" is achieved on all gen-sets by special circuitry allowing only 6% (3600 rpm) and 3% (1800 rpm) harmful harmonic waveform distortion.

● **ENGINES** are all heavy duty and fully equipped with all necessary equipment and are factory tested with their specific fuels; natural gas, LPG or diesel fuels.

● **QUICK CHANGE OIL** with extension drain tube and on-off drain valve.

● **SELECTOR SWITCH** allows "manual" test, "automatic" operation and "maintenance-off" positions.

● **VIBRATION ISOLATORS** for quieter, smoother operation.

● **WRAP-AROUND** steel base (on housed generator sets only).

● "**GALVANEEL**" steel for rust-free housing, finished with baked-on powder coat having UV protection and 1000 hour salt spray protection.

● **HOUSINGS** are weather protected, have full sound absorbing foam with air baffles for quieter operation and all have lockable doors.

● **UL CERTIFIED** automatic transfer switch and generator completes the package of the home or commercial standby gen-set. These UL transfer switches will assure a safe electric load transfer from utility to emergency power (upon blackout conditions), and from emergency to utility power (when normal power is restored).

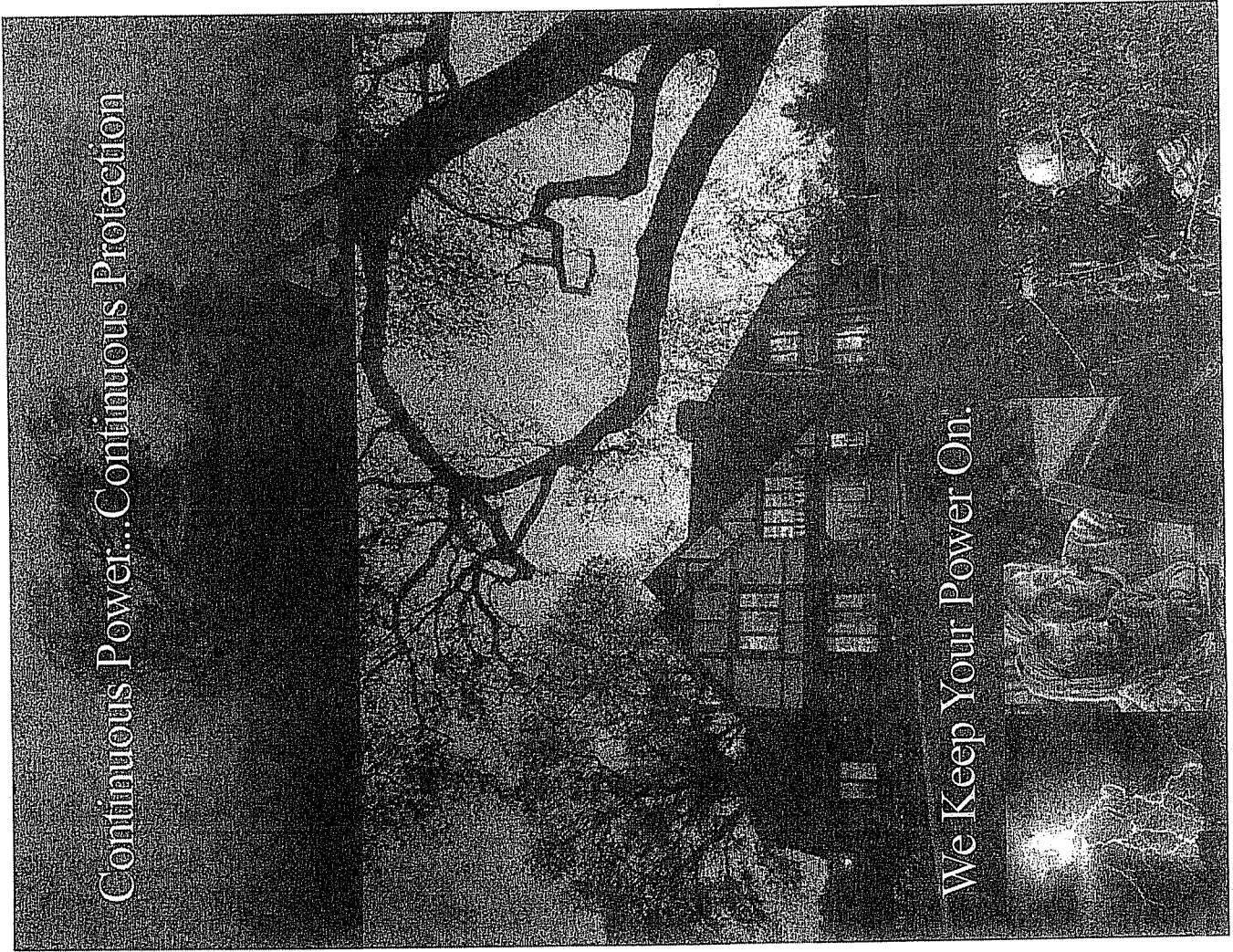
GILLETTE GENERATORS, INC.

1340 Wade Drive • Elkhart, Indiana 46514

WEB SITE: www.gillettegenerators.com

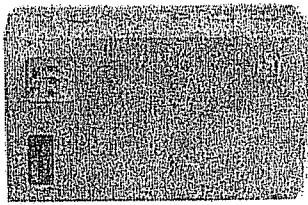
Continuous Power... Continuous Protection

We Keep Your Power On.



An Automatic Transfer Switch helps prevent...

- Your business or home from losing power during bad weather or utility power equipment failures
- The loss of valuable information needed from your computer to keep your business going or maintain important personal data
- Frozen and ruptured water pipes, flooded basements, as well as loss of heat, well water, air conditioning, sump pump, and other vital systems
- Frozen foods from thawing, and refrigerated foods from spoiling
- Personal injury and generator damage by eliminating the possibility of connecting the utility and generator at the same time



ASCO is there for you even when you're not.

Computers, communication and information systems, security systems, cash registers, heating systems, water heaters, refrigerators and freezers, air conditioners, sump pumps, well pumps...nearly every system in your business or home depends on electric power. It's easy to take that power for granted, but when it fails, the results can be disastrous. Generators can restore power to these vital systems...but they can *only* operate when someone turns them on! So what do you do when no one is around?

An ASCO Series 165 Automatic Transfer Switch provides all the intelligence your generator needs to make sure the power stays on when utility power fails. It automatically senses loss of utility power, and signals your generator to start and restore power to your business or home. The Series 165 Automatic Transfer Switch will automatically transfer your vital loads back to utility power when it has been restored.

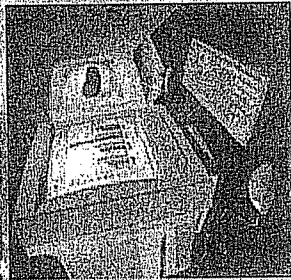
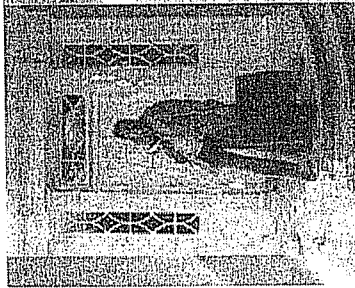
Working hand in hand with your generator, ASCO's Series 165 Automatic Transfer Switch silently provides dependable 24-hour protection from a power failure, and springs into action only when needed.

Never
put up with
a power
failure...

again!



24-hour
protection
no matter
when
trouble
strikes.



Power protection.

Power outages cause millions of dollars of damage to businesses and residences annually. Not to mention jeopardizing personal safety and convenience.

A generator is only one piece of the solution... ASCO provides the other.

An ASCO Series 165 Automatic Transfer Switch is the vital electrical link that makes continuous power virtually seamless...and hassle free.

ASCO Series 165 Automatic Transfer Switches are suitable for operation with portable or permanently mounted standby generators from 2 kW to 45 kW.

Whether you're home or not, an ASCO 165 Automatic Transfer Switch and your generator will maintain power to your business or home.

ASCO Series 165 Residential/ Light Commercial Automatic Transfer Switches.

Time Delays

- 3-second time delay to override momentary utility source.
- 15-second transfer to emergency time delay to allow engine generator to stabilize after starting.
- 15-second time delay after transfer to the standby source to ignore momentary voltage dips on the generator during initial loading.
- 5-minute time delay on retransfer to allow utility source to stabilize prior to transferring the load back to utility.
- 1-minute unloading running time delay for engine generator cool-down before shutdown.

External Power Connections

Switch Rating (amps)	Wire Size Range
100	(1) #8 to 3/0 AWG
200*	(1) #8 to 3/0 AWG

* UL listed for 200 amps with copper conductors only. All Series 165 switches are furnished with a neutral bar and lugs to accommodate cable sizes shown above.

Product Features

- Nominal voltage 120/240 V 60 Hz, single phase.
- Listed to UL 1008 for total system loads (motors and all other electrical loads).
- Meets National Electrical Code (NEC) and National Fire Protection Association (NFPA) requirements.
- True double-throw contacts (no intentional off position), with inherent mechanical interlocking to prevent connection of generator and utility source.
- Convenient terminals to connect neutral and ground conductors from service and load feeders.
- Available in Type 1 (indoor) and Type 3R (outdoor) enclosures.
- Manually-operated Series 165 Transfer Switches are also available. See back cover.
- Available from stock.

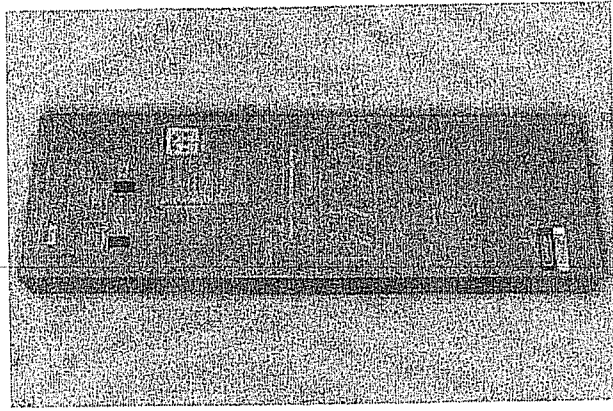
Diagnostic Indicators

The 165 Automatic Transfer Switch has a unique built-in automatic digital diagnostic monitoring system, which provides status on potential system problems such as: generator failed to start; generator over frequency; transfer switch did not transfer; and more. It's one more way you can count on ASCO to provide continuous power protection...anytime.

ASCO Series 165 PTLC Power Transfer Load Center

Product Features

- Suitable for use as service entrance equipment.
- Load Center rated at 200 amps, 240/60 Hz single phase, 10 kA withstand rating.
- 2 pole Series 165 Automatic Transfer Switch.
- Service disconnect breakers for utility and generator sources.
- Integral mounted and wired two-stage surge suppression (TVSS's) utilizing Silicon Avalanche Diode (SAD) technology.
- Independent visual LED indication on each TVSS Module for convenient protection status.
- Remote indication for TVSS's hardwired (Form C Dry Contacts).
- Load center available in either 30 or 42 position configuration, suitable for distribution breakers (not supplied) rated 20 amps per pole.
- Modular design for ready access to components from the front of the enclosure for easy replacement.
- UL Type 1 Enclosure



Withstand and Close-On Ratings

Switch Rating (amps)	When Used With Current Limiting Fuses	When Used With Circuit Breakers
100	200,000	10,000
200	200,000	10,000

Suppression Module Specifications

	Primary	Secondary
Nominal Clamp Voltage	211 Vpk	230 Vpk
Response Time	< 5ns	< 20ns
Peak Pulse Energy	520 Joules	> 2500 Joules
Peak Pulse Current (8X20µs)	up to 24 kA	156 kA
Protection	Overcurrent & Overvoltage (thermal)	

Agency Approvals

- UL 67 (Panelboard)
- UL 1449 Recognized (Surge Suppressors)
- UL 1008 (Automatic Transfer Switch)
- NEC (National Electrical Code) and NFPA (National Fire Protection Agency) approval (Automatic Transfer Switch)

Peace of Mind

**Protect
your home,
business, and
peace of mind**

**with the
ASCO Series 165
Automatic
Transfer Switch.**

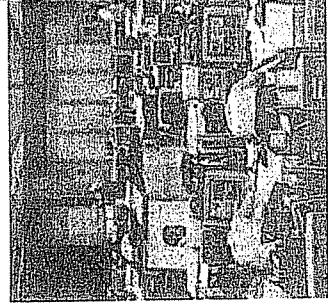
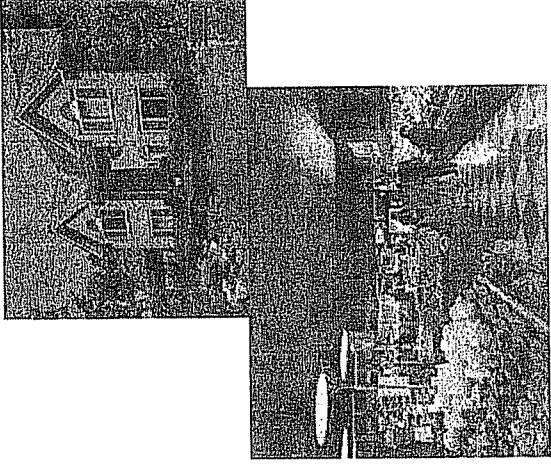
Why should you choose an ASCO Automatic Power Transfer Switch?

Customer service, rock-solid dependability, and the industry's highest performance have made ASCO the first choice in emergency power for more than 110 years. Our power transfer switches are used in more emergency power backup systems worldwide than any other. ASCO is the name behind most of the technological advances in transfer switch design, and we have more patents than all other manufacturers combined. ASCO transfer switches are the first choice for installations of every kind, from homes and small businesses to the largest financial data centers and hospitals in the world.

What you should know about UL 1008—and your safety.

The Series 165—and every ASCO Transfer Switch—meets or exceeds the stringent requirements of UL 1008, the only UL transfer switch standard. It even says so right on the front panel. If you don't see the UL Automatic Transfer Switch label...you're not getting the best protection money can buy.

Transfer Switch.

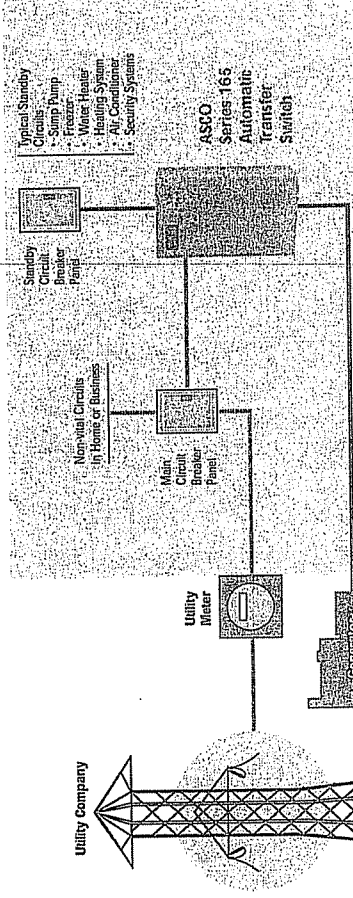


Performance sets the Series 165 apart.

The Series 165 Automatic Transfer Switch incorporates the latest technology developed by ASCO for dependable operation in any environment.

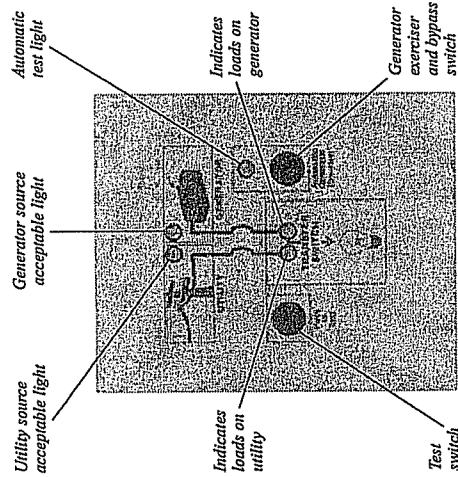
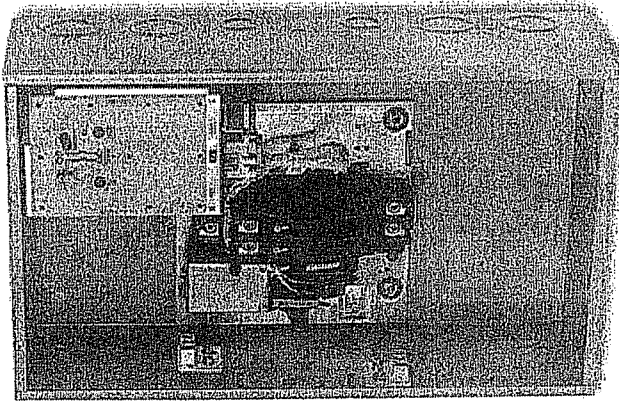
- When utility power fails for just 3 seconds or more, the Series 165 Automatic Transfer Switch signals the generator to start.
- In less than 30 seconds your electrical power is restored.
- Once the Series 165 Automatic Transfer Switch senses utility power has reached an acceptable voltage level for a period of time, it automatically reconnects your power.
- It then smoothly shuts the generator down after a 1-minute cool-down period to extend generator life.
- The Series 165 Automatic Transfer Switch automatically performs a test to simulate utility power failure every 14 days.
- The user-friendly control panel also allows you to manually run a test at the push of a button.
- LED indicators let you know the availability of both power sources and transfer switch positions.

System Diagram



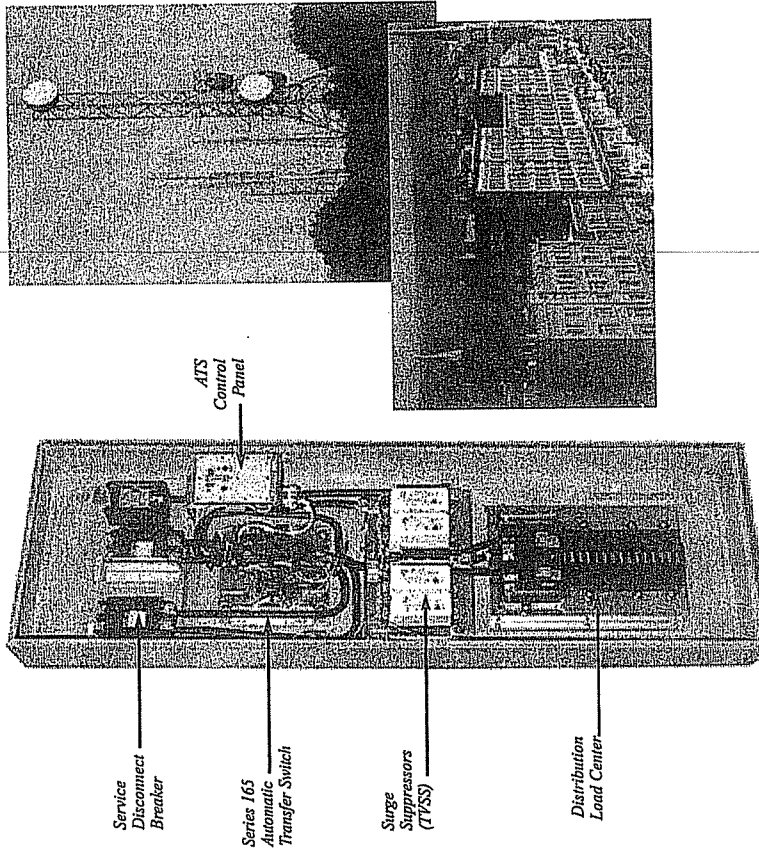
POWER SOLUTION

Series 165 Automatic Transfer Switch



Control Panel

User-friendly control panel with easy to understand symbols and all the necessary visual indicators to inform the operator of transfer switch and power source status.

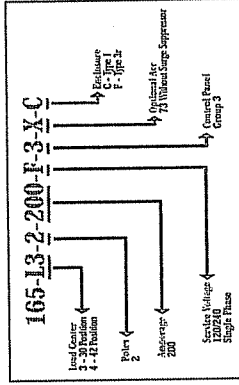


Ordering Information

To order an ASCO Series 165 Transfer Switch, refer to the catalog numbers below.

Automatic Transfer Switch		Automatic Transfer Switch Dimensions and Weights					
Catalog Number	Enclosure	Switch Rating	Enclosure Poles	Width inches (mm)	Height inches (mm)	Depth inches (mm)	Weight lb (kg)
165A2100F3C	Type 1 Indoor	100	2	14.25 (362)	24 (610)	8 (203)	67 (31)
165A2200F3C	Type 1 Indoor	200	2	14.25 (362)	24 (610)	8 (203)	67 (31)
165A2100F3F	Type 3R Outdoor	100	2	14.75 (375)	25 (635)	8.5 (216)	82 (37)
165A2200F3F	Type 3R Outdoor	200	2	14.75 (375)	25 (635)	8.5 (216)	82 (37)

Operating Information

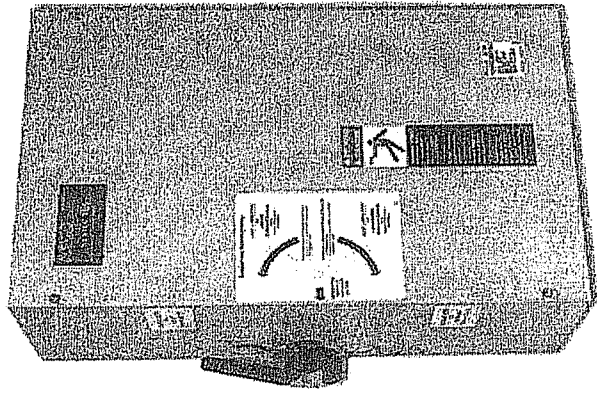


External Power Connections

Wire Size Range		Dimensions and Weight			
Enclosure	Wire Size Range	Width inches (mm)	Height inches (mm)	Depth inches (mm)	Weight lb (kg)
Type 1	#8 to #0 AWG	20 (508)	65 (1651)	5.75 (146.05)	110 (50)

*UL listed for 200 amps with copper conductors only.

ASCO Series 165 Manual Transfer Switch.



Product Features

- Identical to the electrically operated type 165 except operation is manually initiated.
- Operation is achieved through direct manual quick-make/quick-break handle from the outside of the enclosure.
- True double-throw, inherently interlocked construction to absolutely prohibit connecting both sources together.
- UL 1008 listed for total system loads.
- Ideal for those applications that have manual start generators without provisions for automatic engine start.
- Pad locking provisions on operating handle to prevent unauthorized operation.
- Same withstand and close-on ratings as Series 165 automatic version.

Ordering Information

To order an ASCO Series 165 Manual Transfer Switch, refer to the catalog numbers below.

Manual Transfer Switch

Catalog Number	Enclosure	Ampere
165A2100FOC	Type 1 Indoor	100
165A2200FOC	Type 1 Indoor	200
165A2100FOF	Type 3R Outdoor	100
165A2200FOF	Type 3R Outdoor	200

Manual Transfer Switch Dimensions and Weights

Switch Rating	Enclosure	Poles	Width		Height		Depth		Weight	
			inches (mm)	inches (mm)	inches (mm)	inches (mm)	lb (kg)	lb (kg)		
100	Type 1 Indoor	2	14.25 (362)	24 (610)	8 (203)	67 (31)				
200	Type 1 Indoor	2	14.25 (362)	24 (610)	8 (203)	67 (31)				
100	Type 3R Outdoor	2	14.75 (375)	25 (635)	8.5 (216)	82 (37)				
200	Type 3R Outdoor	2	14.75 (375)	25 (635)	8.5 (216)	82 (37)				

Note: Manual operating handle extends 2 1/2" on left side of enclosure.

ASIA · AUSTRALIA · BRAZIL · CANADA · GERMANY · JAPAN · MEXICO · SOUTH AFRICA · UNITED ARAB EMIRATES · UNITED KINGDOM · UNITED STATES

ASCO

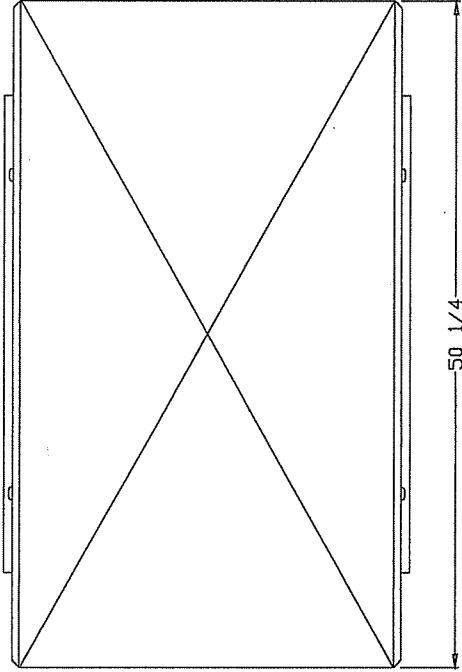
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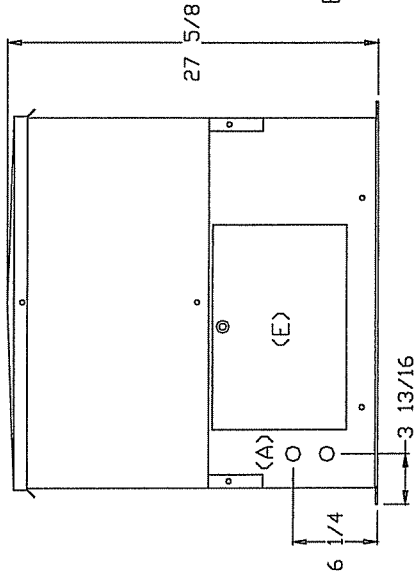
**EXTERIOR VIEW AND DIMENSIONAL DETAIL FOR 3600 RPM SP2 & SP4 SETS
 MODELS : SP2-85, SP2-100, SP2-120, SP4-85, SP4-100, & SP4-120**

TOP VIEW

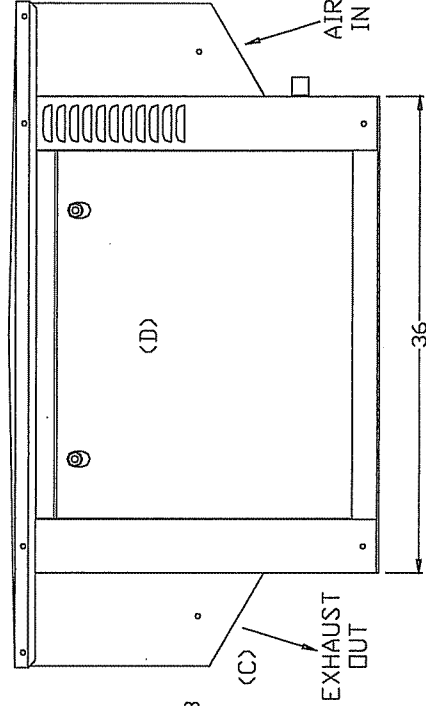


- (A) (2) ENTRY K.O. POINTS FOR INITIAL ELECTRIC WIRING (USE 1/2 OR 3/4 CONDUIT FITTINGS).
- (B) CONNECTION POINT FOR DRY FUEL (3/4 COUPLER).
- (C) MUFFLER IS LOCATED INSIDE & EXHAUST PIPE POINTED OUT OF EXHAUST END.

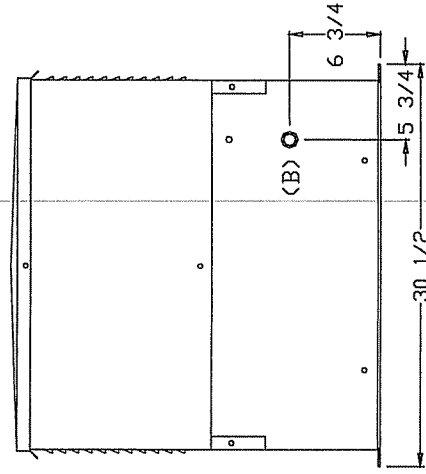
- (D) LARGE SIDE DOORS WITH LOCKING ACCESS FOR MAINTENANCE.
- (E) GENERATOR INSPECTION PANEL WITH LOCKING ACCESS
- CIRCUIT BREAKER, CONTROLS ARE LOCATED INSIDE UNIT.
- OIL DRAIN IS LOCATED INSIDE WITH A PIPE EXTENSION FOR EASY DRAINAGE.



EXHAUST END VIEW

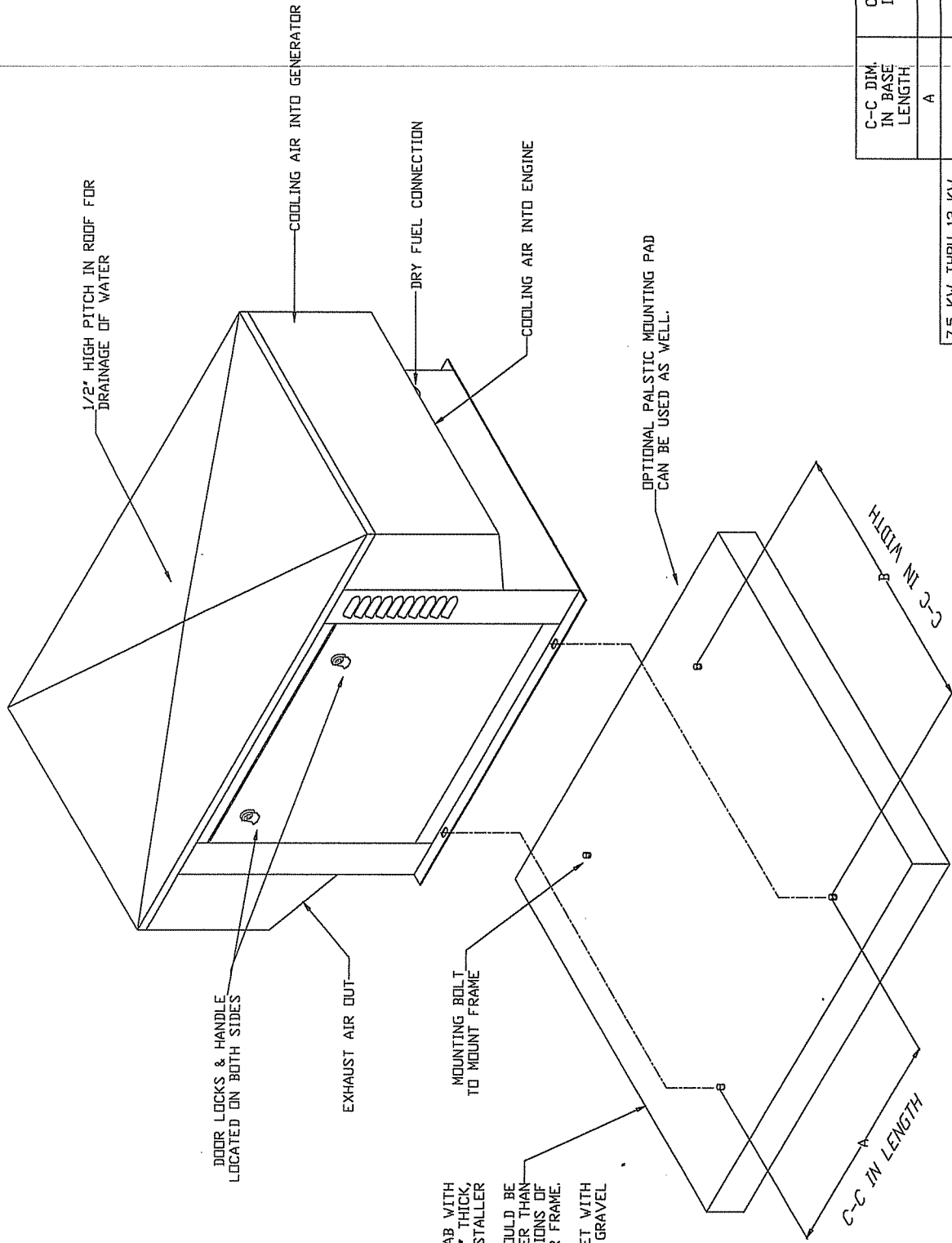


SIDE VIEW



AIR INTAKE END VIEW

MOUNTING DIMENSIONS FOR 3600 RPM STANDBY SETS 7 KW THRU 12 KW



CEMENT SLAB WITH MINIMUM OF 4" THICK, SUPPLIED BY INSTALLER

SLAB DIMENSIONS SHOULD BE MINIMUM 4" LARGER THAN PERIMETER DIMENSIONS OF GENERATOR FRAME.

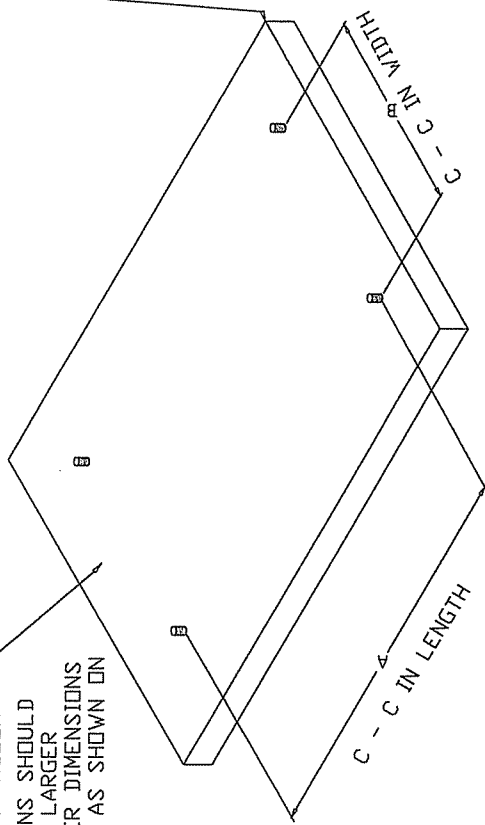
PAD SHOULD BE SET WITH 4" PERIMETER OF GRAVEL

	C-C DIM. IN BASE	
	LENGTH	WIDTH
7.5 KW THRU 12 KW FOR DRY FUEL ONLY	29-1/2"	29-1/4"

MOUNTING DIMENSIONS FOR STANDBY SETS, 7.5 KW THRU 125.0 KW

CEMENT SLAB WITH
MINIMUM OF 4" THICK
SUPPLIED BY INSTALLER
SLAB DIMENSIONS SHOULD
BE MINIMUM 4" LARGER
THAN PERIMETER DIMENSIONS
OF GENERATOR AS SHOWN ON
PAGE 8.

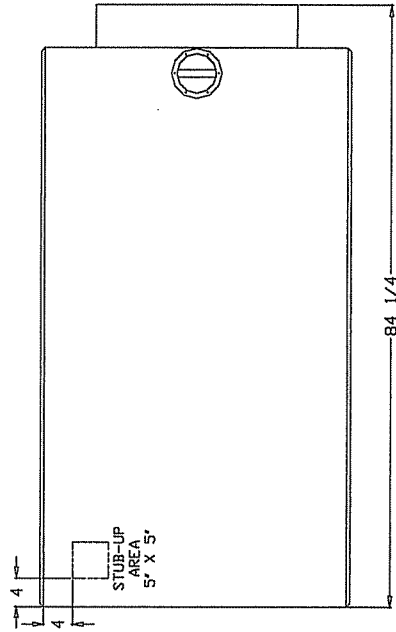
CEMENT SLAB MINIMUM OF 4" THICK
OR USE THE PORTABLE SURFACE MOUNT
PAD AS FURNISHED BY YOUR DISTRIBUTOR



FRAME LG X WI	DESCRIPTION OF STANDBY SET	C-C DIM. IN BASE LENGTH	C-C DIM. IN BASE WIDTH
		A	B
36" X 31"	7.5 KW THRU 12 KW 3600 RPM FOR DRY FUEL ONLY	29-1/2"	29-1/4"
53" X 34"	15.0 KW 3600 RPM FOR DIESEL AND DRY FUEL	41"	30-1/2"
68" X 36"	16.5 KW THRU 33.0 KW 1800 RPM FOR DIESEL AND DRY FUEL	56"	32"
78" X 42"	40.0 KW THRU 75.0 KW 1800 RPM FOR DIESEL AND DRY FUEL	66"	39"
98" X 48"	80.0 KW THRU 135.0 KW 1800 RPM FOR DIESEL AND DRY FUEL	86"	45"
118" X 48"	185.0 KW THRU 200.0 KW 1800 RPM FOR DIESEL FUEL ONLY	106"	45"

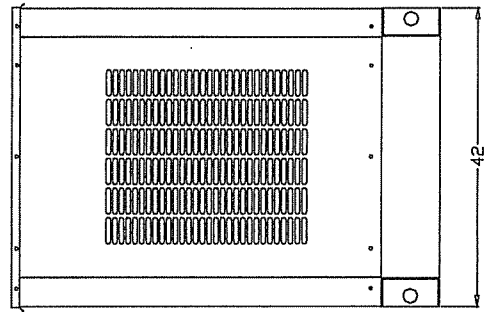
OUTLINE DIMENSIONS FOR 40 THRU 75 KW

TOP VIEW

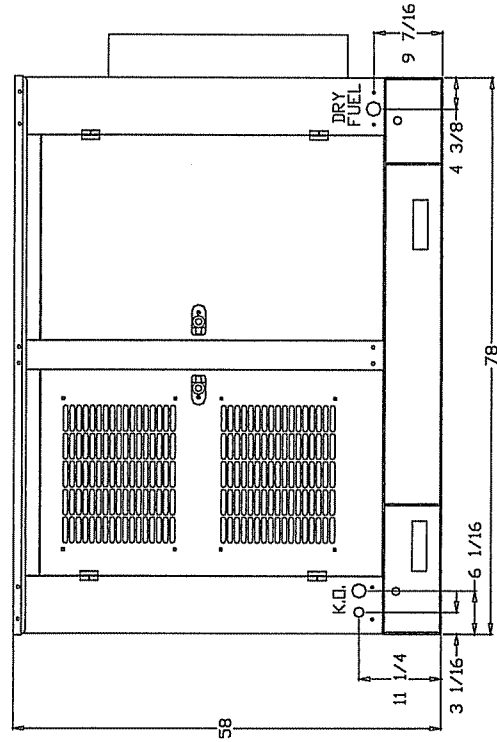


STANDARD HOUSING SHOWN INCLUDES AIR BAFFLES AND INSULATION FOR NOISE
 SIDE HINGED & KEY LOCKED DOORS
 CONTROLS LOCATED INSIDE HOUSING, MOUNTED ON TOP OF GENERATOR
 EXTERIOR MUFFLER MOUNTED ON TOP NOT SHOWN

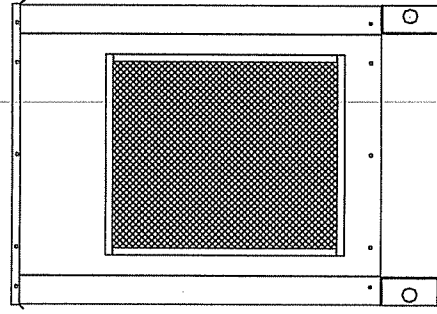
OVER SIZED DOOR FOR EASY MAINTENANCE
 REMOVABLE RADIATOR FILL CAP FOR EASY FILL
 SIDE BASE SLOTS & HOLES FOR EASY MOVEMENT DURING INSTALLATION
 KNOCK-OUT HOLES FOR ELECTRICAL WIRING INSTALLATION



GENERATOR END VIEW



SIDE VIEW



RADIATOR END VIEW

SENTRY-PRO

RESIDENTIAL STANDBY SET
WITH LPG-NATURAL GAS FUEL

SP4 SERIES INDICATES A "PACKAGED" STANDBY SET REQUIRING A SPECIFIC 4-WIRE 100 AMP AUTO TRANSFER SWITCH FOR 120/240 VAC 1Ø APPLICATIONS. ANY REQUESTED CHANGE IN THIS TRANSFER SWITCH (LARGER AMP SIZE, 3Ø POWER, DIFFERENT BRAND, OR COMPLETE OMISSION OF PACKAGED SWITCH) CAUSES MODEL PREFIX CHANGED TO SP2 SERIES.

60 HERTZ

1 PHASE, 120/240 VOLTS OR
3 PHASE, 208, 240, 480, 220 VOLTS

GENERATOR MODEL FOR SINGLE PH.	SP4-85-1-1 (SP2-85)	SP4-100-1-1 (SP2-100)	SP4-120-1-1 (SP2-120)	SP4-150-1-1 (SP2-150)
TYPE OF FUEL USED	LPG	NAT. GAS	LPG	NAT. GAS
MAXIMUM KW @ SINGLE PHASE	8.5	7.5	10.0	12.0
STANDBY KW @ SINGLE PHASE	8.0	7.0	9.0	11.0
STANDBY AMPS @ 120 VOLTS	66	58	76	84
STANDBY AMPS @ 240 VOLTS	33	29	38	42
MAXIMUM KVA @ 3 PHASE .8 P.F.	10.5	9.0	12.5	15.0
STANDBY KVA @ 3 PHASE .8 P.F.	9.5	8.0	11.0	14.0
STANDBY KW @ 3 PHASE .8 P.F.	7.5	6.5	9.0	11.0
STANDBY AMPS @ 208 VOLT, 3Ø	26.0	22.5	31.0	34.5
STANDBY AMPS @ 240 VOLT, 3Ø	22.5	19.5	27.0	30.0
STANDBY AMPS @ 480 VOLT, 3Ø	11.0	10.0	13.5	15.0
STANDBY AMPS @ 220 VOLT, 3Ø	24.5	21.0	29.5	33.0
ENGINE BRAND	VANGUARD		KOHLER	
ENGINE COOLING	AIR COOLED		LIQUID COOLED	
ENGINE HP AT LPG OR NAT. GAS DRY FUEL	17	14	17	23
ENGINE CU. CENTIMETERS	570	570	570	725
ENGINE CYLINDERS	2	2	2	2
ENGINE LUBRICATION	ALL MODELS: FULL PRESSURE OIL LUBRICATION WITH ADDITIONAL SPIN-OFF REPLACEABLE OIL FILTER			
SUPER QUIET MUFFLER	ALL MODELS: SPECIAL RESIDENTIAL STYLE MUFFLER FOR OPTIMUM EXHAUST SOUND REDUCTION			
ENGINE FUEL PRESSURE	6 OUNCE PRESSURE, VAPOR WITHDRAWAL			
FUEL USE @ 100% LOAD (FT ³ /HR)	55	122	60	85
FUEL USE @ 75% LOAD (FT ³ /HR)	41	98	45	64
dB(A) AT 7 M (E=STD. ENCL., O=OPEN)	E=69, O=77	E=67, O=75	E=71, O=78	E=75, O=83
GENERATOR REGULATION	±5% VOLTAGE REGULATION			
FREQUENCY REGULATION	5% FREQUENCY REGULATION ON ALL MODELS			
"KLEEN-POWER"	WAVEFORM (SINE-WAVE) HARMONIC DISTORTION IS LIMITED TO JUST 7% ON ALL SENTRY-PRO GENERATORS			
"TIF" DISTORTION	TELEPHONE INTERFERENCE FACTOR (TIF) DISTORTION IS LIMITED TO JUST 250			
CODE G ELECT. MOTOR START	2 1/2 HP	2 HP	3 HP	5 HP
HIGH TEMP SHUTDOWN	OPTIONAL ON AIR COOLED ENGINES			
OVERSPEED SHUTDOWN	ALL MODELS: STANDARD EQUIPMENT			
OVERCRANK SHUTDOWN	ALL MODELS: 15 SECOND CRANK, 15 SECOND REST. (3) INDIVIDUAL STARTING ATTEMPTS BEFORE SHUTDOWN.			
GEN. FAILURE SHUTDOWN	ALL MODELS: STANDARD EQUIPMENT			
LOW OIL SHUTDOWN	ALL MODELS: STANDARD EQUIPMENT			
MAIN CIRCUIT BREAKER	ALL MODELS: STANDARD EQUIPMENT (OPTIONAL ON ALL 3 PHASE GEN-SETS)			
TIME DELAY, ENG START	ALL MODELS: 10 SECOND DELAY BEFORE ENGINE STARTS TO AVOID NUISANCE ON-OFF STARTING			
TIME DELAY, COOL DOWN	ALL MODELS: 5 MINUTE DELAY ON SHUT DOWN TO COOL DOWN GEN-SET AT NO LOAD RUNNING			
STARTING BATTERY SIZE	12 VDC, 380 CCA, 50 AMP/HR MIN. SIZE			
AUTOMATIC START-STOP CONTROLS	ALL "SP4" MODELS: SYSTEM UTILIZES PROGRAMMABLE, MICROPROCESSOR CONTROLLER, LOCATED IN ASCO TRANSFER SWITCH, COUPLED TO RE-LAY LOGIC LOCATED IN GENERATOR. THIS COMBINED FUNCTION MAKES A "PACKAGE" OF GEN-SET AND TRANSFER SWITCH. ALL "SP2" MODELS HAVE IT'S OWN MICROPROCESSOR, SO ANY BRAND 3 PHASE AUTO TRANSFER SWITCH CAN BE USED.			
WEATHER ENCLOSURE	ALL MODELS: ALL GALVANNEEL WEATHER ENCLOSURE WITH POWDER COAT PAINT SOUND PROOFING SYSTEM			
APPROX. L X W X H HOUSED (OPEN)	51" L X 30 1/2" W X 27 1/2" H (36" L X 30 1/2" W X 23" H)			
NET WT. "PACKAGED" HOUSED SET*	385	400	460	570
SHIP WT. "PACKAGED" HOUSED SET*	435	450	510	620
NET WT. "PACKAGED" OPEN SET*	285	300	360	430
SHIP WT. "PACKAGED" OPEN SET*	335	350	410	495

NOTES: * STARTING BATTERY IS NOT FURNISHED WITH THESE SENTRY-PRO GENERATORS. PRIMARY REGULATOR FOR LPG TANK IS NOT FURNISHED. ALL DRY FUEL, (LPG AND NATURAL GAS) ENGINES HAVE CARBURATORS SET FOR 6 OUNCE FUEL PRESSURE (11" WATER COLUMN). NOTIFY GILLETTE FOR SPECIAL CARBURATOR IF YOUR NATURAL GAS PRESSURE IS 4 OUNCE FUEL PRESSURE (7" WATER COLUMN).
* ALL NET AND SHIPPING WEIGHTS FOR ALL SP4 SETS INCLUDE ASCO TRANSFER SWITCH WEIGHTS. DEDUCT 75 LBS AND 1.7 CUBIC FEET FROM SHIPPING SPECS., IF SWITCH IS DELETED.

Form Gil-SPC-330-20030906

GILLETTE GENERATORS, INC 1340 WADE DRIVE
WEB-SITE : <http://www.gillettegenerators.com> E-mail : sales@gillettegenerators.com

ELKHART, IN 46514 USA
E-mail : sales@gillettegenerators.com

TEL. (574) 264 - 9639
FAX (574) 262 - 1840

SENTRY-PRO

WITH LPG-NATURAL GAS FUEL

AUTO. START-STOP, DRY FUEL HOUSED STANDBY SETS SPECIFICATIONS.
NOTE: 1 PH. AND 3 PH. POWER SPECIFICATIONS, INDICATE TWO DIFFERENT
GENERATOR SETS, ADD "-3" TO ALL MODELS FOR 3 PHASE GEN-SETS.

60 HERTZ

1 PHASE, 120/240 VOLTS OR
3 PH., 208, 220, 240, 480 VOLTS

GENERATOR MODEL TYPE OF FUEL USED	SP-180		SP-220		SP-300		SP-420		SP-600		SP-850		SP-1000		SP-1250	
	LPG	NAT. G	LPG	NAT. G	LPG	NAT. G	LPG	NAT. G	LPG	NAT. G	LPG	NAT. G	LPG	NAT. G	LPG	NAT. G
MAXIMUM KW @ SINGLE PHASE	18.0	18.0	22.0	22.0	30.0	27.0	42.0	40.0	60.0	58.0	85.0	80.0	103.0	100.0	115.0	125.0
STANDBY KW @ SINGLE PHASE	18.0	18.0	19.0	19.0	27.0	25.0	39.0	38.0	58.0	56.0	76.0	74.0	94.0	92.0	105.0	116.0
STANDBY AMPS @ 120 VOLT, 1Ø	150	150	158	158	226	208	326	316	484	466	634	616	784	766	876	966
STANDBY AMPS @ 240 VOLT, 1Ø	75	75	79	79	113	104	163	158	242	233	317	308	392	383	438	483
MAXIMUM KVA @ 3 PHASE .8 P.F. *	22.5	22.5	27.5	27.5	37.5	33.8	52.5	50.0	75.0	72.5	106.0	100.0	128.8	125.0	143.8	156.0
STANDBY KVA @ 3 PHASE .8 P.F. *	# 21.0	20.0	27.5	27.5	33.8	31.0	47.5	45.0	72.5	70.0	95.0	92.5	117.5	115.0	131.0	140.0
STANDBY KW @ 3 PHASE .8 P.F. *	# 17.0	16.0	22.0	22.0	27.0	25.0	40.0	38.0	58.0	56.0	76.0	74.0	94.0	92.0	105.0	112.0
STANDBY AMPS @ 208 VOLT, 3Ø *	# 56	56	76	76	94	87	139	132	194	188	250	250	313	313	365	389
STANDBY AMPS @ 240 VOLT, 3Ø *	51	48	66	66	81	75	120	114	175	169	229	223	283	277	316	337
STANDBY AMPS @ 480 VOLT, 3Ø *	26	24	33	33	41	38	60	57	87	84	115	111	142	139	158	169
STANDBY AMPS @ 220 VOLT, 3Ø *	56	53	72	72	89	82	131	125	190	184	250	243	309	302	345	368
GENERAL MOTORS, VORTEC ENG.	3.0 L	3.0 L	3.0 L	3.0 L	3.0 L	3.0 L	4.3 L	4.3 L	5.7 L	5.7 L	8.1 L	8.1 L	8.1 L	8.1 L	8.1 L	8.1 L
ENGINE INDUCTION SYSTEM	NATURALLY ASPIRATED															
ENGINE HORSE POWER MAX RATING	45 HP	42 HP	45 HP	42 HP	45 HP	42 HP	68 HP	64 HP	105 HP	95 HP	150 HP	140 HP	161 HP	148 HP	175 HP	186 HP
ENGINE CUBIC IN. DISPL. (LITERS)	181 (3)	181 (3)	181 (3)	181 (3)	181 (3)	181 (3)	262 (4)	262 (4)	350 (5.8)	350 (5.8)	496 (8)	496 (8)	496 (8)	496 (8)	496 (8)	496 (8)
ENGINE CYLINDERS	4	4	4	4	4	4	6	6	8	8	8	8	8	8	8	8
ENGINE LUBRICATION	ALL MODELS: FULL PRESSURE OIL LUBRICATION WITH ADDITIONAL SPIN-ON REPLACEMENT OIL FILTER															
INDUSTRIAL MUFFLER	ALL MODELS: INDUSTRIAL STYLE MUFFLER FOR GOOD EXHAUST SOUND REDUCTION															
FUEL USE @ 100% LOAD (FT ³ /HR) *	119	275	122	306	144	360	197	480	330	800	425	1020	511	1164	1462	1660
FUEL USE @ 75% LOAD (FT ³ /HR) *	79	199	88	221	104	260	172	421	250	695	350	830	400	895	1135	1375
ENGINE ALTERNATOR OUTPUT	ALL MODELS: 70 AMPS FOR CHARGING WITH MAXIMUM AMPERAGE OUTPUT @ 12 VOLTS DC															
dB(A) @ 7 M (E=STD, ENCL., O=OPEN) *	E=70, O=76	E=71, O=77	E=71, O=77	E=71, O=77	E=72, O=78	E=72, O=78	E=74, O=80	E=74, O=80	E=76, O=82	E=76, O=82	E=81, O=85	E=81, O=85	E=86, O=89	E=86, O=89	E=88, O=92	E=88, O=92
dB(A) @ 7 M W/SS & RESIDENT. MUFF.	64	65	65	65	66	66	68	68	71	71	75	75	80	80	83	83
dB(A) @ 7 M W/SS & CRITICAL MUFF.	62	63	63	63	64	64	66	66	69	69	72	72	78	78	80	80
GENERATOR REGULATION	ALL MODELS: PLUS-MINUS 1% VOLTAGE REGULATION USING SOLID STATE EXTERNAL VOLTAGE REGULATOR															
FREQUENCY (SPEED) REGULATION	ALL MODELS: PLUS-MINUS 1% FREQUENCY REGULATION WITH ELECTRONIC GOVERNOR SYSTEM															
ENGINE COOLING	ALL MODELS: LIQUID COOLED WITH PUSHER FAN AND 125°F RADIATOR															
ENGINE PROTECTION CONTROLS	ENGINE SHUTDOWN FOR: LOW OIL, HIGH TEMPERATURE, OVERSPEED, OVERCRANK WITH 3 STARTING ATTEMPTS															
"SENTINEL III" DIGITAL CONTROLLER, PROGRAMMABLE MICROPROCESSOR, PLUS LCD METERING OF GENERATOR AND ENGINE FUNCTIONS	DIGITAL CONTROLLER FOR ENGINE SHUTDOWNS AND AUTOMATIC START-UP FUNCTIONS, PLUS LCD METERING OF: PHASE TO PHASE VOLTAGE, PHASE TO NEUTRAL VOLTAGE, PHASE CURRENT (AMPS), FREQUENCY (HERTZ), COOLANT TEMP. (IN DEG. F OR DEG. C), OIL PRESSURE (BAR OR PSI), HOURS RUN (RUN TIME), BATTERY VOLTAGE, ACTIVE POWER (WATTS), REACTIVE POWER (VOLT-AMPS), PLUS ADDITIONAL SYMBOLS AND LEGENDS ASSOCIATED WITH EACH READING.															
"KLEEN-POWER"	ALL MODELS: MAXIMUM 4% DISTORTION ON GENERATED SINE WAVE															
CODE G, ELECT. MOTOR START	10 HP	8 HP	12 HP	10 HP	18 HP	15 HP	25 HP	24 HP	40 HP	36 HP	50 HP	48 HP	60 HP	57 HP	75 HP	75 HP
BATTERIES REQUIRED *	12 VDC, 660 CCA, 55 AMP/HR															
WEATHER/SOUND ENCLOSURE	RUST PROOFED GALVANEEL WEATHER ENCLOSURE W/ POWDER COAT PAINT & SOUND PROOFING FOAM ON BOTH STD. ENCL. & SUPER-SILENT															
APPRX. LG X WI X HI W/ SUPER-SILENT	92" X 36" X 53"															
APPRX. LG X WI X HI W/ STD. ENCL.	74" X 36" X 53"															
APPRX. LG X WI X HI NO ENCLOSURE	50" X 32" X 34"															
SUPER-SILENT (NET WT.) SHIP WT LBS	(1460)	1560	(1495)	1595	(1530)	1630	(2077)	2227	(2496)	2646	(2925)	3150	(3160)	3385	(3335)	3560
STD. ENCL. (NET WT.) SHIP WT LBS	(1275)	1375	(1310)	1410	(1345)	1445	(1887)	2037	(2306)	2456	(2675)	2900	(2910)	3135	(3085)	3310
OPEN SET (NET WT.) SHIP WT. LBS	(875)	975	(910)	1010	(945)	1045	(1337)	1487	(1806)	1956	(2075)	2300	(2310)	2535	(2485)	2710

NOTES: STARTING BATTERY IS NOT FURNISHED WITH THESE SENTRY-PRO GENERATORS. * FUEL RATINGS BASE ON 1000 BTU/FT³ FOR NATURAL GAS, 2500 BTU/FT³ FOR LPG, AT STANDBY/RATING.
*KW AND AMP RATINGS MAY BE DIFFERENT WITH SOME VOLTAGES. CHECK SINGLE MODEL SPEC SHEETS FOR FULL INFORMATION ON THESE ASTERISK MARKED RATINGS.

GILLETTE STANDBY GENERATOR START-UP INSPECTION

MODEL:	SERIAL NUMBER:	FUEL:
OWNER:	DISTRIBUTOR:	INSTALLER:
PHONE:	PHONE:	PHONE:
PURCHASE DATE:	START-UP DATE:	START-UP TECH:

PRE-START CHECK LIST

- Check for freight damage, loose screws, loose fuel hose connections, check every wire termination for solid tight fit. Terminations often loosen after long freight hauls.
- LPG FUEL: Fuel bottle should be 100 lbs. or more. Primary regulator (installed on fuel bottle) must be set for 6 oz. or 11" water column. LPG must be of vapor withdrawal type.
- NATURAL GAS FUEL: Check utility fuel. It will be either 4 oz. (7" water column) or 6 oz. (11" water column). The utility fuel pressure must match the fuel pressure as stamped on secondary regulator.
- Fuel line diameter is same or larger than Owners Manual diameter recommendations.
- All fluid levels are correct: Anti-freeze, Battery electrolyte, Crankcase oil, Air cleaner oil
- Adequate Air Flow: Gen-set is positioned so that snow, leaves, ice, etc. cannot block air flow.
- Generator is 100 feet or less from Transfer Switch controls. (Otherwise note distance _____ FT.)
- All A-C and D-C controls wires plus A-C load wires are copper stranded (no solid wires). All D-C wires are run in separate conduit.
- Battery is new, fully charged and is a minimum 300 cold cranking amps or larger.
- Battery tests good with hydrometer. Unconnected battery voltage is _____ DC volts. Connect battery. Energize commercial powered battery charger. Battery voltage is _____ D-C volts.
- Battery charger is functioning if this option was installed.
- All wiring is done by licensed electrician.
- All fuel lines and connections are done by qualified and experienced installers.

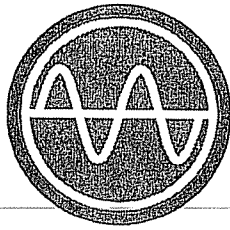
START-UP CHECK LIST

- Follow Owners Manual instructions on initial generator set start-up.
- Check and correct any fluid, fuel or exhaust lines.
- Check and correct loose hardware, rattles, vibrations, loose wires.
- Start and stop engine several times. It may be necessary to adjust fuel load block for smooth engine idle or full load smooth engine performance.
- Allow engine to start and stop automatically several times by simulating a normal power failure.
- Manually start and stop engine several times from generator panel and transfer switch panel.
- Run generator and connect load. Assure that owner understands maximum load demands.
- Set Plant Exerciser to owner's required exercise period. (where applicable)
- Make sure all transfer and timing control options are adjusted and operating to owner's needs.
- Check overcrank shutdown by closing fuel valve and starting engine. Three individual 15 second engine crank cycles will take place before complete shutdown occurs.
- Test Voltage Output: No Load Volts _____ Frequency _____
Full Load Volts _____ Frequency _____
- Instruct owner/operator on the complete operation of a standby generator set.

**SEND WHITE COPY BACK TO GILLETTE
DISTRIBUTOR KEEPS PINK COPY
OWNER KEEPS YELLOW COPY**

FAILURE TO RETURN GILLETTE'S COPY MAY VOID WARRANTY.

Gillette Generators, Inc. - 1340 Wade Drive, Elkhart, Indiana 46514
PHONE: 574-264-9639 FAX: 574-262-1840 E-Mail: sales@gillettegenerators.com



GILLETTE GENERATORS

SENTRY-PRO

**ELECTRIC GENERATOR
POWER SYSTEMS
OWNER'S GUIDE**

**RESIDENTIAL 2 POLE &
INDUSTRIAL 4 POLE
EMERGENCY STANDBY
GENERATORS USING
SP, SP2, SP4, SPD, SP2D, AND SP4D
SERIES CONTROL SYSTEMS**

CALIFORNIA PROPOSITION 65 WARNING

ENGINE EXHAUST FROM THIS PRODUCT CONTAINS CHEMICALS KNOWN TO CAUSE CANCER,
BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

GILLETTE GENERATORS, INC. — 1340 WADE DRIVE ELKHART, INDIANA 46514 USA
TEL: (574) 264-9639 FAX: (574) 262-1840 E-MAIL: sales@gillettegenerators.com
VISIT OUR INTERNET SITE AT: <http://www.gillettegenerators.com>

SENTRY-PRO

ELECTRIC GENERATOR POWER SYSTEMS OWNER'S GUIDE

CAUTION:

This manual and the manufacturer cannot possibly anticipate every possible happening that might involve a hazard. The Listings, Warnings, and Cautions in this manual and on tags and decals affixed to the equipment are therefore, NOT ALL INCLUSIVE. If a certain procedure, work method, test method, or operating procedure that is not recommended by this manufacturer, is used, the person or company responsible for the gen-set modification, must assume all responsibility for safety and correct operation for the operator and all others within general gen-set area. Read your generator and engine operator's manuals carefully. Know your equipment before you use it. Consider the application, limitations, and potential hazards, before operating the gen-set.

DEFINITION OF OPERATION

- A) Intermittent operation (also identified as "standby" or "maximum" ratings): These ratings apply where load on engine varies, and engine runs at wide open throttle. No more than ten minutes of full load operation within any hour of continuous operation, is allowed. No overload is available at this rating.
- B) Continuous operation (also identified as "rated" power output): These ratings are reduced by 10% from ratings explained in (A) above. Overloads of 10% are available within ten minutes of each hour, of engine continuous use.

PERFORMANCE DERATING

When matching a gen-set to a specific application, whether gross intermittent or gross continuous ratings are used, it is important to derate output for the following adverse conditions:

- A) Engine horsepower rating after "break-in" is usually within (3%) of name plate HP rating.
- B) Exhaust system losses occur with inadequate mufflers or long exhaust systems which tend to reduce the engine HP, therefore directly reduce the electrical output.
- C) Temperature and altitude directly de-rate engine HP ratings. Therefore, de-rating total KW output by same amount. Derate 3 1/2% for each 1000 ft. above 328 ft. over sea level. Derate 1 % for every 10° F above an ambient temperature of 77° F.
- D) Fuel quality variations will reduce engine HP output, therefore directly reduce electrical output.
- E) Normal wear and poor maintenance will reduce engine HP, therefore directly reduce electrical output.

PREFACE:

This generator set is a very high quality, electric power source. It is intended for temporary electric power to energize all electrical equipment up to 75% of generator standby rating.

Before starting your generator set, thoroughly study the instructions and cautions in this manual to insure you are fully acquainted with the operation of this set. Proper preparation, operation and maintenance will result in operator safety, best performance and long life of generator set.

For detailed engine operation, always refer to the separate engine instruction book furnished with the set.

This generator set is constantly upgraded. The specifications outlined herein are subject to change without prior notice or obligation. The purchaser and/or user assumes liability of any modification and/or alterations made on this equipment from original design and manufacture. Before using, user shall determine the suitability of this product for its intended use and assumes liability therein.

1. INTRODUCTION:

This generating set consists of generator, engine, base and power take off means.

The generator is a brushless, revolving field, synchronous type with one ball bearing. The rotor of the generator is directly connected to the engine crankshaft and the stator is rigidly coupled to the engine casting, through the bearing casting.

2. FEATURES:

POWER ASSIST™ is a winding design to insure minimum power fluctuations, maintains excellent voltage regulation and provides superior induction motor load starting power. 15 KW and larger sets utilize an external voltage regulator mounted within the genset for plus-minus 1% regulation.

INNOVATIVE WINDING consists of all copper field and rotor windings, large diameter electrical grade steel laminations, Class H high heat insulation protection, all to insure against burn-outs or early failures.

KLEEN-POWER™ is an exclusive winding method allowing a range only 3% to 7% harmonic distortions on it's generated power waveform.

3. GENERAL RULES FOR SAFE OPERATIONS:

Safety precautions are essential when operating this equipment. Using this equipment with respect and caution will reduce the possibilities of personal injury. This manual will warn of specific personal injury potential, and the following symbols found throughout the manual will bring your attention to possible dangerous conditions to the operator, service personnel and to the equipment.

DANGER!



THIS SYMBOL WARNS OF IMMEDIATE HAZARDS AND DANGERS WHICH WILL RESULT IN SEVERE PERSONAL INJURY OR DEATH.

WARNING!



THIS SYMBOL WARNS OF A HAZARD OR UNSAFE PRACTICE THAT CAN RESULT IN SEVERE PERSONAL INJURY OR DEATH.


CAUTION!





THIS SYMBOL WARNS OF HAZARD OR UNSAFE PRACTICE THAT CAN RESULT IN PERSONAL INJURY, PRODUCT OR PROPERTY DAMAGE.


This manual and the manufacturer cannot possibly anticipate every possible happening that might involve a hazard. The listings, warnings, and cautions in this manual and on tags and decals affixed to the equipment are, therefore, **NOT ALL INCLUSIVE**. If a certain procedure, work method, test method and operating procedure that is not recommended by this manual and by this manufacturer is used, you must assume all responsibility that it is safe for you and for all others. You must also be sure that the generator will not be harmed or damaged or made unsafe by the procedure, work or method you have chosen. If you modify or change this equipment in any way from the original design, you must assume all responsibility for its safe operation.


⊗ Read your generator and engine operator manuals carefully, know your equipment before you use it. Consider the application, limitations and potential hazards before operation.


DANGER  This generating set is equipped with a ground terminal for your protection. Always complete the grounding path from the set to an external grounding source to prevent electrical shock


CAUTION  Electric load applied to generating set should be no more than 75% of generator maximum rating.


CAUTION  Generating set must reach operating speed before load is applied. Disconnect electric loads before shutting engine down.


WARNING  Maintain electrical cords or permanent wiring in good condition. Worn, bare, frayed or otherwise damaged cords and wiring can cause electric shock.


DANGER  Never operate the generating set, or handle any electrical equipment while standing in water, while barefoot, while hands are wet, or while in the rain or snow to prevent dangerous electric shock.


DANGER  A ground fault circuit interrupter (GFCI) should be used in damp or high electrical conductive areas and construction job-sites to prevent electric shock.


WARNING  Before working on the engine or the generator, always remove the spark plug or otherwise dis-engage the engine to prevent accidental starting. On standby units especially-be sure to set the system maintenance switch to the "OFF" or "STOP" position.


WARNING  Check generating fuel system on a regular basis. Look for signs of leaks, deterioration, chafed or spongy fuel hose, loose or missing fuel hose clamps, rusted or damaged fuel tanks, defective fuel shut-off valve. Correct any defects before operation.


DANGER  Always provide adequate ventilation. Do not operate set in any enclosed or narrow space. Engines consume oxygen and give off deadly carbon monoxide poisonous gas. Improper ventilation will cause damage to set and possible injury to people.


WARNING  Avoid severe burns by not touching hot muffler, hot exhaust manifold, or engine cooling cylinders.


WARNING  Keep generator and engine clean. Remove all oil or gasoline deposits, and accumulated dirt from set and immediate area. Poor housekeeping creates a fire hazard.


CAUTION  Keep a fire extinguisher close by your set and be familiar on how to use it. Consult your local fire department for correct extinguisher type.


CAUTION  Do not smoke or allow an open flame near the generator nor its fuel system. Do not allow oily rags in generator compartment. Keep area around generator set free of debris and flammable materials. Fuel lines must be adequately secured and free of leaks. Fuel connections at the engine should be done with approved flexible line.


WARNING  Do not smoke while servicing battery. Lead acid battery will emit a highly explosive hydrogen gas that can be ignited by open flame, electrical arc or by smoking.

WARNING  Be sure that a positive fuel shut-off manual valve (furnished by installer) be located in fuel line and close to generator compartment. A fuel filter (furnished by installer) should also be installed in fuel line between generator and manual fuel valve.


WARNING  Do not allow exhaust fumes to enter building or room that is occupied by people or animals. The generator must be installed outdoors where adequate ventilation is available. Inspect exhaust systems daily for leaks or breaks.


CAUTION  Do not use exhaust gases to heat a generator compartment, or any other areas.


CAUTION  An absolute, unobstructive flow of cooling air is required to expel toxic and flammable fumes inside generator compartment. Do not allow normal cooling slots of generator compartment to become obstructed.


WARNING  Keep your hands and hair away from moving parts.


WARNING  Keep guards in position over fans, belts, and any moving parts.

WARNING  Do not wear loose clothing or jewelry while servicing set. Loose clothing can become caught in moving parts. Jewelry can short out electrical circuits and cause you shock or burning skin.

WARNING  If adjustments must be made while generator set is running, use extreme caution around hot manifolds, hot mufflers, and moving parts.


DANGER  Electric shock will cause severe personal injury or death.


DANGER  Never work on the generator set or electrical panel while standing in wet conditions, barefoot, or while hands and feet are wet. **A DANGEROUS ELECTRIC SHOCK MAY RESULT.**


DANGER  Remove electric power before removing protective shields or touching electrical equipment. Use rubber insulating mats placed on dry wood platforms over floors that are metal or concrete or when you are on grass or earth.

The unit should never be operated under the following conditions:

- A. Change in engine speed, slow or fast
- B. Overheating in load connecting devices.
- C. Sparking or arcs from set.
- D. Loss of electrical output.
- E. Engine misfire.
- F. Excessive vibration.
- G. Enclosed compartments, or confined areas.
- H. Flame or smoke
- I. Rain, snow or water conditions with open units.

DANGER  Good ventilation. Avoid areas where vapors can be trapped such as boat bilges, basements, garages, etc. Air flow and temperatures are important. Never operate set when ambient temperature is over 105° F.

DANGER  Engine exhaust gas is poisonous and dangerous. The gas contains carbon monoxide, an odorless, invisible gas which causes serious illness or death if breathed. Always direct exhaust fumes away from humans.

DANGER  In case of accident caused by electric shock, shut the source of electric power off at once. If this cannot be done, free the victim from source of live power. **AVOID ANY DIRECT CONTACT WITH THE VICTIM OR THE LIVE ELECTRIC POWER.** Use a dry piece of wood, a dry rope, or any other such non-conductive device to free the victim from source of power. If the victim is semi or

totally unconscious, apply CPR (cardio-pulmonary resuscitation) and call for medical help immediately.

DANGER REGARDLESS OF THE SAFE DESIGN OF THIS EQUIPMENT, THE OPERATOR MAY BE INJURED OR DEATH MAY OCCUR IF CARELESS, IMPRUDENT OPERATION TAKES PLACE OR IF A NEGLECT OF MAINTENANCE OCCURS. THE GENERATOR DEVELOPS ENOUGH ELECTRICAL POWER TO CAUSE A FATAL SHOCK. FAULTY APPLICATION AND INSTALLATION OF ANY GENERATOR SET CAN LEAD TO SEVERE PERSONAL INJURY, DEATH AND/OR PROPERTY DAMAGE. FIRE, MECHANICAL OR STRUCTURAL BREAKDOWN, ELECTROCUTION, AND EXHAUST GAS ASPHYXIATION CAN RESULT FROM FAULTY INSTALLATION. THE INSTALLATION AND APPLICATION OF ANY GENERATOR SET MUST BE PERFORMED BY QUALIFIED PERSONS.

GENERATOR SET DESCRIPTION: This equipment is a generator driven by a diesel, gasoline, or dry fueled engine. It is for production of electric power designed to supply emergency electricity in the event that normal utility electric power is lost, not available, or is not practical to use. (Special applications are available where gasoline driven units are required. Consult factory for details).

GENERATOR SET FEATURES: Included with this 1 piece system are the following:

- ◆ Exhaust silencer (muffler) installed or furnished loose for installation by others (depending on model and KW size).
- ◆ Battery rack and battery cables (starting battery must be furnished by installer).
- ◆ **OPTIONAL** 12 VDC battery charger.
- ◆ **OPTIONAL** AC engine crankcase oil heater to warm the engine oil in areas where severely cold weather occurs..
- ◆ **OPTIONAL** AC engine coolant heater to warm the engine block in areas where severely cold weather occurs.
- ◆ **OPTIONAL** AC battery heater to warm the starting battery in areas where severely cold weather occurs.
- ◆ **OPTIONAL** U.L.-142 CERTIFIED DIESEL FUEL TANKS.
- ◆ Hour meter records actual run time and helps schedule maintenance work.
- ◆ Special engine starter motor cut-out control automatically disengages starter system from engine flywheel upon successful engine starting thereby saving starting components from damage due to accidental start error by operator (available on both SP2-fully automatic and SP4-semi automatic 3600 RPM models plus SP & SPD 1800 RPM models).
- ◆ Low Oil Shutdown protection. If oil pressure falls below acceptable level, this safety device will shut down the entire system and will not restart until oil level is restored (available on both SP2-fully automatic and SP4-semi automatic 3600 RPM models plus SP & SPD 1800 RPM models).
- ◆ Over Speed Shutdown Protection. If engine should run beyond it's design speed, this safety device will shut down the entire system before "Over Speed" can destroy electronic and mechanical componets (available on SP2-fully automatic models, plus SP & SPD 1800 RPM models).
- ◆ High temperature Shutdown protection. If engine coolant temperature level rises above acceptable level, this safety device will shut down the entire system and will not restart until proper coolant temperature is restored (available on both SP2-fully automatic and SP4-semi automatic models, plus SP & SPD 1800 RPM models).

INSTALLATION STANDARDS AND CODES

The following list of standards as issued by the National Fire Protection Association (NFPA) pertains to the installation and operation of this generator set. These standards and codes can change and may vary by location or over time.

<u>STANDARD NUMBER</u>	<u>TITLE</u>
NFPA #37	Combustion Engines
NFPA #70	National Electrical Code
FPA #99	Health Care Facilities
FPA #101	Life Safety Code
NFPA #110	Emergency & Standby Power Systems

Local, State, and National Electrical building codes must be followed. Occupational Safety and Health Administration (OSHA) established regulations must be followed. Nothing must be done to alter the design or operation of the generator set to render it non-compliance with such mandated codes, regulations, laws, and standards.

GENERAL INFORMATION

INTRODUCTION: This owner's manual is prepared especially for the emergency electric power plant (generator) that is intended to be a temporary source of electric power where normal power does not exist. The gen-set can also serve as a standby power system to utility power, with addition of an automatic transfer switch and automatic start stop controller or manual transfer switch, with manual operation. This manual will also familiarize personnel with its design, installation, connection and operation. Every effort is used to ensure that the contents in this manual are both accurate and current. However, manufacturer reserves the right to change, alter, modify, update, and otherwise improve the generator set without prior notice.

◆ Generator failure Shutdown protection. If generator output falls below acceptable level, this safety device will shut down the entire system for all models.

◆ "KLEEN-POWER" allowing only 3 to 7% average wave form power distortion and only 50 telephone influence factor making the emergency power from these generator sets safe to use with all electric loads.

TEST PROCEDURES: Output voltage frequency and current have been carefully checked. All engines are "green" and have not been broken in. It will require approximately 50 hours for the engine to achieve maximum break-in horsepower. At this time, engine horsepower ratings meet SAE J1349 test codes which specify reduced ratings of 3 1/2% for each 1000ft. over 328 feet above sea level and 1% for every 10°F(5.56°C) rise above 77°F(25°C). Generator specifications are in accordance with ASA, NEMA, and IEEE standards. Rated generator set output is based on factory tests of typical units and is subject to correction due to temperature, altitude, fuel, the guarantee of all engine manufacturers that engines will produce ratings to be within 85% of maximum hp ratings before final break-in occurs, to be within 95% of maximum hp ratings after final break-in occurs, and other conditions as specified by the manufacturer.

PRIOR TO INSTALLATION : Before any installation begins, recheck the ratings of the generator. The generator must be larger in electrical rating than the connected load and must be the same voltage frequency and phase. Plans for installation should be thought about and prepared in advance, with proper attention to mechanical and electrical details.

"OPEN" SENTRY-PRO INSTALLATION FOR ALL SP2, SP4, SP2D, SP4D, SP, AND SPD MODELS

~~~~~(SEE PAGES 5 THRU 10)~~~~~

The successful operation and proper functioning of any generator set depends primarily on the initial installation. If a set is installed correctly, based upon the guidelines outlined in this manual and consistent with the normal practices generally associated with the installation of electrical and mechanical equipment, it can provide years of dependable service. If installation is not done properly, the result can be continuing problems.

The information contained in this manual is , of necessity, general in nature. Such topics as location and mounting, room size, ventilation and air flow, engine cooling, exhaust system, fuel system, electrical, and service and maintenance requirements are covered.

By following the suggestions in this installation manual, an economical and efficient generator set installation with satisfactory operating characteristics can be expected. The final installation criteria are subject to National, State and Municipal codes, Insurance regulations, and specific site or installation conditions which may alter the recommendations

contained herein. It must be emphasized that proper coordination and planning prior to installation will save time, money, and problems, and result in years of trouble-free operation.

It must be emphasized that this installation is not a "do it yourself", homeowner type job. The total information contained herein is offered as suggestions and helpful tips to the qualified and experienced professional contractor. A licensed electrician must be involved in all electrical wiring. Your local Fire Department can be of assistance in providing a safe installation. Always employ the services of experienced professionals for final site location, plumbing of fuel and exhaust systems, and the electrical system. Your local Fire Department is an excellent source for a final inspection to determine a good, safe installation.

**DANGER** NEVER INSTALL AN ELECTRIC POWER SYSTEM IN A BUILDING OR SHELTER THAT IS ALSO FREQUENTLY OR INFREQUENTLY USED BY HUMANS OR ANIMALS. FUMES FROM EXHAUST AND DIESEL FUEL ARE DEADLY AND CAN CAUSE SICKNESS OR DEATH IF INHALED. CALIFORNIA 65 PROPOSITION WARNS THAT "ENGINE EXHAUST FROM THIS PRODUCT CONTAINS CHEMICALS KNOWN TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM".

**PRIOR TO INSTALLATION :** Before any installation begins, recheck the KW rating of the generator. The generator must be 25% larger in electrical rating than the connected load and must be the same voltage frequency and phase. *(Plans for installation should be thought about and prepared in advance, with proper attention to mechanical and electrical details.)*

**SEPARATE ROOM INSTALLED, OPEN, NON-ENCLOSED SENTRY-PRO GENERATOR SET INSTALLATION FACTORS FOR LIQUID COOLED ENGINES.**  
**NOTE: IT IS NOT RECOMMENDED TO INSTALL AIR COOLED ENGINES IN A SEPARATE ROOM.**

### VENTILATION

Any internal combustion engine requires a liberal supply of cool, clean air for combustion. If the air entering the engine intake is too warm or too thin, the engine may not produce its rated power. Operation of engine and generator radiates heat into the room and raises the temperature of the room air. Therefore, ventilation of the generator room is necessary to limit room temperature rise and to make clean, cool intake air available to the engine. When the engine is cooled by a set-mounted radiator, the radiator fan must move great quantities of air through the radiator core. There must be enough temperature difference between the air and the water in the radiator to cool the water sufficiently before it recirculates through the engine. The generator set supplier can provide the maximum air temperature limit for which the cooling system is designed. The air temperature at the radiator inlet depends on the temperature rise of air flowing

through the room from the inlet ventilator. By drawing air into the room and expelling it outdoors through a discharge duct. The radiator fan helps to maintain room temperature in the desirable range. In providing ventilation, the objective is to maintain the room air at a temperature that is cool enough for efficient operation and full available power; but not be so cold in winter that engine starting is difficult.

## CIRCULATION

Good ventilation requires adequate flow into and out of the room, and free circulation within the room. The room should be of sufficient size to allow free circulation of air so that temperatures are equalized, and there are no pockets of stagnant air. The generator set should be located so that the engine intake draws air (an engine "pusher" fan) from the cooler part of the room. If there are two or more generator sets, avoid locating so that air heated by the radiator of one set flows toward the engine intake or radiator of an adjacent set. A typical arrangement for adequate air circulation and ventilation is shown in Figure 1 on page 9.

## VENTILATORS

To bring in fresh air, there should be an inlet ventilator opening to the outside or at least an opening to another part of the building through which the required amount of air can enter in smaller rooms. Ducting may be used to bring air to the room or directly to the engine's air intake. In addition, an exit ventilator opening should be located on the opposite outside wall, preferably high up, to exhaust warm air. If the exit air ventilator is located in the lower position, sufficient air flow may be generated by convection. Otherwise, a fan must be installed in the exit ventilator.

Both the inlet and exit ventilators should have louvers for weather protection. These may be fixed; but preferably should be movable in cold climates. For automatic starting generator sets, if the louvers are movable, they should be operated automatically, and those on the air inlet ventilator should be programmed to open immediately upon starting the engine. Inlet louvers must be large enough to allow the intake air flow needed for satisfactory engine performance.

The louvers and fan in the exit ventilator may be thermostatically controlled so that the fan operates as needed, and louver position is varied in response to room temperature. The generator set is equipped with a set-mounted "pusher" radiator fan and if there is a discharge duct for radiator air, most or all of the air required for room cooling is drawn into the room and discharged outdoors by the radiator "pusher" fan. In this case, the exit ventilator fan will probably be quite small (if required at all), and the exit ventilator fan will probably operate to exhaust a portion of the air flow outdoors only when the generator set is operating at high load or when outdoor temperature is high.

## INLET VENTILATOR SIZE

Before calculating the inlet ventilator size, it is necessary to calculate the air flow required to limit the room temperature rise due to radiation when the generator set is operating at

its rated load. Total heat radiated by the complete generator set, including the exhaust system in the room, should be taken into account.

Heat radiation for engines and generators, when operating at standby rated power, are shown on engine specification sheets. Exhaust system radiation depends on the length of pipe within the room, the type of insulation used, and whether the silencer is located within the room or outside. It may be possible to insulate the exhaust piping and silencer so that heat radiation from this source may be neglected in calculating air flow required for room cooling. Calculate the required air flow using the total heat radiation and any temperature rise that may be accommodated without exceeding temperature rise and without exceeding temperature limits at the radiator inlet or engine intake compare the calculated room ventilation air flow with the total of engine combustion air flow and radiator air flow discharged from the room the larger flow is the required inlet ventilator air flow.

After determining the required air flow into the room, calculate the size of inlet ventilator opening to be installed in the outside wall. The inlet ventilator must be large enough so that the flow restriction at a selected air velocity will not generally exceed 0.3 inches H-2-O water column including the restriction of a screen and louver that may be used in the ventilator. The inlet air flow restriction must be very low since this restriction adds to the radiator fan loss and to the engine combustion air inlet depression.

Screens, filters, and louvers in the ventilators will tend to increase the air flow restriction; therefore, the inlet air velocity may have to be reduced by increasing the area of the ventilator. Restriction values of air filters, screens and louvers should be obtained from the manufacturers of these items.

## EXIT VENTILATOR SIZE

If the engine is cooled by a heat exchanger or remote radiator, the exit ventilator must be large enough to exhaust all of the air flowing through the room except the relatively small amount that enters the engine intake. If the engine is cooled by a set-mounted radiator that discharges air outdoors through a duct, the exit ventilator size is based on that portion of the air flow required for room cooling, which exceeds the total of radiator air flow plus combustion air flow. Exit ventilator should be sized to limit the restriction to radiator air flow to no more than 0.3 inches H-2-O water column.

In some cases, the total of radiator and combustion air flow will exceed the air flow required for room cooling, so no exit ventilator is needed.

## ENGINE EXHAUST

Engine exhaust must be directed to the outside through a properly designed exhaust system that does not create excessive back pressure on the engine. A suitable exhaust silencer should be connected into the exhaust piping either inside or outside the building. Exhaust system components

located within the engine room should be insulated to reduce heat radiation. The outer end of the pipe should have an elbow or U shape and should be equipped with a rain cap to prevent rain or snow from entering the exhaust system. If the building is equipped with a smoke detection system, the exhaust outlet should be positioned so that it cannot set off the smoke detection alarm.

**DANGER** ENGINE EXHAUSTS CONTAIN ELEMENTS WHICH ARE HARMFUL TO PERSONS, ANIMALS AND PROPERTY. EXHAUST STACKS MUST BE PROPERLY ROUTED TO AN OUTDOOR AREA IN COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS. KEEP ENGINE EXHAUST AWAY FROM BUILDING AIR INLETS OR HUMAN AND ANIMAL HABITATS.

### EXHAUST PIPING

For both installation economy and operating efficiency, engine location should make the exhaust piping as short as possible with minimum bends and restrictions. Usually the exhaust pipe extends through an outside wall of the building and continues up the outside of the wall to the roof where there should be a collar in the wall opening to absorb vibration, and an expansion joint in the pipe to compensate for lengthwise thermal expansion or contraction. Another method is to connect the exhaust pipe into a flue or stack (provided local laws permit) thus eliminating the tail pipe that would otherwise run up to the roof. There should be an expansion joint into the pipe and collar in the stack wall and inside the stack, the end of the exhaust pipe should be directed upward. Directing the engine exhaust pipe upward avoids reflection of exhaust pulsation's from the stack wall back into the exhaust pipe. Such pulsation's may affect exhaust back pressure.

When the exhaust is connected into a flue or stack, the silencer may be mounted inside the building so the exhaust gas passes through the silencer and then into the stack. The silencer may also be mounted vertically inside the stack whereas the silencer need not be insulated but the stack may have to be larger to avoid air flow restriction. In rare cases, connecting into a stack may make it possible to eliminate the silencer since exhaust pulsation's might be sufficiently dissipated in a large stack to exit far enough ground level to be less bothersome.

It is not recommended that the engine exhaust share a flue with a furnace or other equipment since there is a possibility that pressure caused by one will adversely affect operation of the other. In multi-engine installations, do not connect engine exhaust systems together because exhaust gases from an operating engine can migrate back through a non-operating engine and cause severe damage.

The exhaust can be directed into a special stack that also serves as the outlet for radiator discharge air and may be insulated. The radiator discharge air enters below the exhaust gas inlet so that the rising radiator air mixes with the exhaust gas. The silencer may be located within the stack

or in the room with its tailpipe extending into the stack and then upward. Air guide vanes should be installed in the stack to turn radiator discharge air vertically.

### EXHAUST PIPE FLEXIBLE SECTION

A flexible connection between the manifold and the exhaust piping system should be used to prevent transmitting engine vibration to the piping and building and to isolate the engine and piping from forces due to thermal expansion, motion or weight of piping. A well-designed flex section will permit operation with +/- 1/2 inch permanent displacement in any direction of either end of the section without damage. Not only must the section have the flexibility to compensate for a nominal amount of permanent mismatch between piping and manifold, but it must also readily yield to intermittent motion of the generator set on its spring isolators in response to load changes. The flexible connection is shipped loose with the generator set.

### EXHAUST PIPING INSULATION

No exposed parts of the exhaust system should be near wood or other flammable material. Exhaust piping inside the building should be covered with suitable materials to protect personnel and to reduce room temperature. A sufficient layer of suitable insulating material surrounding the piping and silencer may virtually eliminate heat radiation to the room from the exhaust system. An additional benefit of the insulation is that it provides sound attenuation to reduce noise in the room.

### MINIMIZING EXHAUST FLOW RESTRICTION

Free flow of exhaust gases through the pipe is essential to minimize exhaust back pressure. Excessive exhaust back pressure seriously affects engine horsepower output, durability, and fuel consumption and may cause early engine failure. By resisting the discharge of gases from the cylinder, it causes poor combustion and higher operating temperatures. The major factors that may cause high back pressure include:

- ◆ Exhaust Pipe Diameter too small
- ◆ Exhaust Pipe too long
- ◆ Too many sharp bends in exhaust system

Excessive restriction in the exhaust system can be avoided by proper design and construction. The effect of pipe diameter, length and the restriction of any bends in the system can be calculated to make sure your exhaust system is adequate without excessive back pressure. The longer the pipe and the bends it contains, the larger the diameter required to avoid excessive flow restriction and back pressure. The back pressure should be calculated during the installation planning stage to make certain it will be within the recommended limits for the engine.

When installing a generator set, measure the exhaust pipe length from installation layout drawing. Take exhaust flow data and back pressure limits from the generator set engine



specification sheet. Allowing for restrictions for the exhaust silencer and any elbows in the pipe, calculate the minimum pipe diameter so that the total system restriction will not exceed the recommended exhaust back pressure limit. Refer to Figure 2 page 8 for typical measurement procedure.

Allowance should be made for deterioration and scale accumulation that may increase restriction over a period of time.

A safe rule for exhaust pipe diameter is to use no more than (2) 90° bends and no longer than 15 feet in total exhaust system length for pipe diameter to be of same size of engine exhaust manifold diameter.

**FIGURE 2.**

| EXHAUST PIPE LG. | ENGINE EXHAUST PIPE INSIDE DIAMETERS VERSUS ENGINE H.P. |          |           |            |
|------------------|---------------------------------------------------------|----------|-----------|------------|
|                  | 12-35 HP                                                | 40-65 HP | 70-100 HP | 105-165 HP |
| 0 - 15 FT.       | 1 3/4"                                                  | 2"       | 2 1/2"    | 3"         |
| 15 - 30 FT.      | 2"                                                      | 2 1/4"   | 2 3/4"    | 3 1/4"     |
| 30 - 40 FT.      | 2 1/4"                                                  | 2 1/2"   | 3"        | 3 1/2"     |
| 40 - 60 FT.      | 2 1/2"                                                  | 2 3/4"   | 3 1/2"    | 4"         |

| EXHAUST PIPE LG. | ENGINE EXHAUST PIPE INSIDE DIAMETERS VERSUS ENGINE H.P. |            |            |
|------------------|---------------------------------------------------------|------------|------------|
|                  | 170-200 HP                                              | 205-250 HP | 265-300 HP |
| 0 - 15 FT.       | 4"                                                      | 5"         | 6"         |
| 15 - 30 FT.      | 4 1/4"                                                  | 5 1/4"     | 6 1/4"     |
| 30 - 40 FT.      | 4 1/2"                                                  | 5 1/2"     | 6 1/2"     |
| 40 - 60 FT.      | 5"                                                      | 6"         | 7"         |

NOTE: NO MORE THAN (2) 90° BENDS ARE ALLOWED IN ANY EXHAUST PIPE SYSTEM, BEFORE ENGINE BACK PRESSURE PROBLEMS RESULT. IF (3) BENDS ARE REQUIRED, OR GEN-SET RUNS ON DRY FUEL GAS, OUR RECOMMENDATION IS TO INCREASE ALL PIPE DIAMETERS BY 1/2".

**EXHAUST SILENCING**

Excessive noise is objectionable in most locations. Since a large part of the generator set noise is produced in the engine's pulsating exhaust, this noise can be reduced to an acceptable level by using an exhaust silencer. The required degree of silencing depends on the location and may be regulated by law. For example, the noise of an engine is objectionable in a hospitable area; but is generally not as objectionable in an isolated pumping station.

**! DANGER EXCESSIVE NOISE HAS BEEN KNOWN TO ADVERSELY AFFECT HEARING ABILITY. USE PROPER EAR PROTECTION WHEN IN THE VICINITY OF THE GENERATOR SET. NOTE: THE SET COULD START AT ANY TIME SO PROTECTION SHOULD BE WORN AT ALL TIMES.**

The silencer reduces noise in the exhaust system by dissipating energy in chambers and baffle tubes and by eliminating wave reflection that causes resonance. The silencer is selected according to the degree of silencing required by the site conditions and regulations. The size of

the silencer and exhaust piping should hold exhaust back pressure within limits recommended by the engine manufacturer.

Silencers are rated according to their degree of silencing: "Low Degree" or "Industrial", "Moderate" or "Residential", and "High Degree" or "Critical".

- o Low-Degree or (~~Industrial silencing~~) - Suitable for industrial areas where background noise level is relatively high or for remote areas where partly muffled noise is permissible,
- o Moderate Degree of (~~Residential silencing~~) - Suitable for localities where moderately effective silencing is required. Such as semi-residential areas where a moderate background noise is always present.
- o High Degree or (~~Critical silencing~~) - Provides maximum silencing for residential, hospital, school, hotel, store, apartment building and other areas where background noise level is low, and generator set noise must be kept to a minimum. (This is available at additional cost.)

Cost is lowest for Industrial silencers and highest for critical silencers. The residential type is most often required for generator set applications. Silencers are normally available in two configurations:

1. Silencers with end inlet and end outlet.
2. Silencers with end side inlet and end outlet.

This choice provides flexibility of installation, such as horizontal or vertical, above engine, on outside wall, etc. The side inlet type permits 90 degree change of direction without using an elbow. Both silencer configurations should contain drain fittings in locations that assure the silencer can be drained in whatever altitude it is installed.

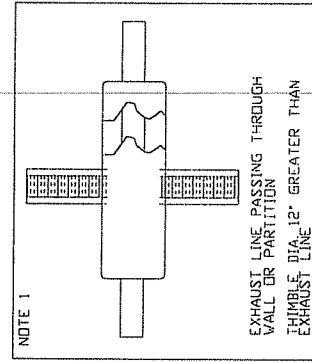
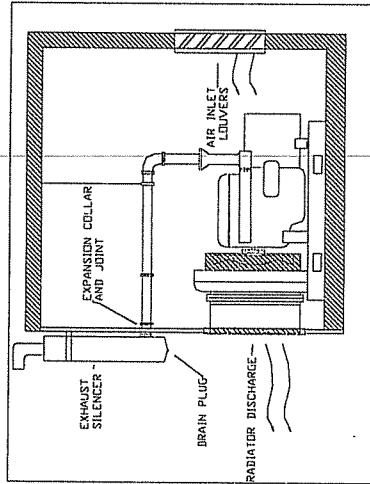
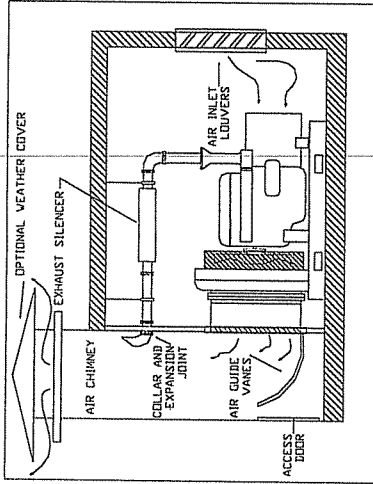
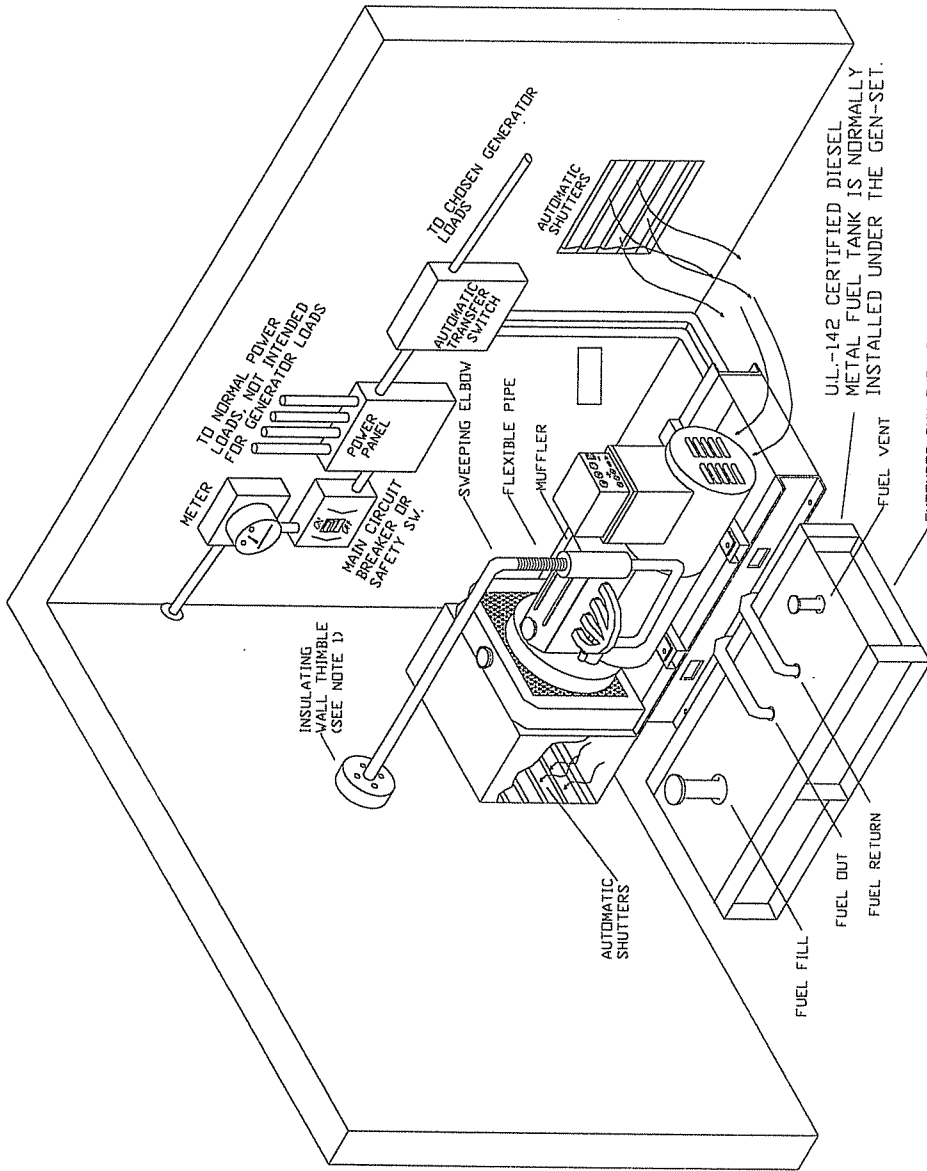
The silencer may be located close to the engine with exhaust piping leading to the outside or it may be located outdoors on the wall or roof. Locating the silencer close to the engine affords the best overall noise attenuation because of minimum piping.

Servicing and draining the silencer is likely to be more convenient when it is located indoors. However, mounting the silencer outside has the advantage that it may not need to be insulated. The job of insulating piping within the room is simpler when the silencer is outside, and the insulation can aid noise attenuation.

Regardless of where it is mounted, the silencer must be adequately supported so that its weight is not applied to the engine's exhaust manifold or turbocharger. The silencer must fit into the space available without requiring extra bends in the exhaust piping as these could cause high exhaust back pressure.

Silencers or exhaust piping within reach of personnel should be protected by guards or insulation. Indoors it is preferable

TYPICAL EXAMPLES OF "OPEN" SENTRY-PRO GENERATOR INSTALLATIONS WITHIN A QUALIFIED BUILDING



NOTE 1

EXHAUST LINE PASSING THROUGH WALL OR PARTITION THIMBLE DIA. 12" GREATER THAN EXHAUST LINE

UL-142 CERTIFIED DIESEL METAL FUEL TANK IS NORMALLY INSTALLED UNDER THE GEN-SET.

ALL WIRING AND ELECTRICAL CONDUIT RUNS MUST BE IN ACCORDANCE WITH APPLICABLE ELECTRICAL CODES. WIRES MUST BE ADEQUATELY SIZED TO CARRY THE SPECIFIC FULL LOAD AMPS OF GENERATOR, AND BE PROPERLY INSULATED. THE BASIC GILLETTE GENERATOR SET PROVIDES A STANDARD (4) LEAD RE-CONNECTABLE 120/240 VOLT SET, OR A (12) LEAD RE-CONNECTABLE TO ANY COMBINATION OF 3 PHASE VOLTAGE. ALWAYS USE THE SERVICES OF AN EXPERIENCED GENERATOR INSTALLER AND LICENSED ELECTRICIAN FOR THIS TYPE OF PROJECT.

YOUR SENTRY-PRO GENERATOR IS MADE FOR EMERGENCY POWER TO BE CONNECTED TO LOADS, UPON A FAILURE OR LACK OF UTILITY POWER. ABOVE DIAGRAMS SHOW EXAMPLES OF SUGGESTED INSTALLATIONS. AN AUTOMATIC TRANSFER SWITCH IS SHOWN MOUNTED ON INSIDE WALL, IN THE EVENT THAT SENTRY-PRO IS USED AS A STANDBY GENERATOR TO UTILITY POWER. (TRANSFER SWITCH IS NOT REQUIRED FOR PRIME POWER APPLICATIONS) THE GEN-SET MAY HAVE A BUILT-IN (OPTIONAL) FUEL TANK IN BASE, OR INSTALLER CAN FURNISH A REMOTE, EXTENDED RUN TANK AS SHOWN.

to insulate the silencer and piping because the insulation not only protects personnel, it also reduces exhaust system noise. Silencers mounted horizontally should be set at a slight angle with a drain fitting at the lowest point to allow the disposal of any accumulated moisture.

## SOUND ATTENUATION

If noise level must be limited, it should be specified in terms of maximum allowable free-air dB(a) at certain points seven meter away from the generator set. When tested under conditions as defined in the engine manufacturers association procedure for engine sound measurement. Then the power room installation must be designed to hold the actual noise inside or outside the room to an acceptable level. Do not attempt to make this noise level unnecessarily low because the means of achieving it may be too costly.

If the use of resilient mounts for the generator set, plus normal techniques for controlling exhaust, intake and radiator fan noise level is still too high, then acoustic treatment of either the room or the generator set may be necessary. Sound barriers can be erected around the set, the walls of the generator room can be sound-insulated, or the generator set can be enclosed in a specially developed sound-insulated hood.

When it is desirable to protect operating personnel from direct exposure to generator set noise, the instruments and control station may be located in a separate sound-insulated control room.

Noise transmitted outside the building by the generator exhaust and radiator discharge can be reduced by having them discharged into a stack lined with non-flammable acoustic material. A lined canopy above the stack reflects noise back into the stack and keeps out rain and snow.


## ENGINE COOLING

A liquid cooled engine is cooled by circulating a liquid coolant through the radiator and through passages in the engine block and head. Hot coolant emerging from the engine is cooled, then recirculated through the engine. Cooling devices are commonly coolant-to-air (radiator) or coolant-to-raw water (heat exchanger) types.

In the most common generator set installations, the engine coolant is cooled in the set-mounted radiator with air blown through the radiator core by an engine driven pusher fan. Some installations use a remotely mounted radiator cooled by an electric motor driven fan. Where there is a continuously available supply of clean, cool, raw water, a heat exchanger is cooled by the raw water supply.

An important advantage of a radiator cooling system is that it is self-contained. If a storm or accident disrupted the utility power source, it might also disrupt the water supply and disable any generator set whose supply of raw water depends upon a utility. Whether the radiator is mounted on

the generator set or mounted remotely, accessibility for servicing the cooling system is important. For proper maintenance, the radiator fill cap, the cooling system drain cocks and the fan belt tension adjustment must all be accessible to the operator. Dirty environments (such as saw-mills or cement quarries) may require a special anti-clog radiator.

**WARNING**  
 **BEFORE ATTEMPTING TO EITHER SERVICE AND/OR REPAIR THE ENGINE, GENERATOR, ENGINE CONTROL PANEL OR FUEL SYSTEM, ALWAYS DISABLE GENERATOR STARTING CIRCUIT BY SWITCHING THE "MAINTENANCE SWITCH" LOCATED ON THE BACK OF THE CONTROL PANEL, TO THE "OFF" POSITION. (DEPENDING ON GENERATOR MODEL) THIS WILL PREVENT START-UP AND POSSIBLE INJURY TO MAINTENANCE PERSONNEL CAUSED BY ACCIDENTAL START-UP, WHILE INSTALLING BATTERY AND WIRING CONNECTIONS.**

## HOUSED SENTRY-PRO (SP2, SP4, SP2D, SP4D, SP AND SPD SERIES) INSTALLATION FACTORS

**PLANNING THE INSTALLATION:** These models all have a weather and sound proof housing installed. Therefore, this generator product has been pre-engineered for proper ventilation cooling, exhaust muffler and piping, and all other requirements, needed for open gen-sets, as specified in previous chapter. The only remaining requirements are selecting the site, and bringing fuel to the engine, and installing the engine starting battery.

**LOCATION OF GENERATOR SET:** Install the generator set outdoors where adequate cooling air is available. The engine and generator need this cooling air for proper ventilation and operation. Install generator where grass, leaves, snow and other obstacles will not accumulate and block cooling air passages in compartment. Install generator on high ground where accumulated water, snow and ice cannot endanger the set. Install the generator as close as possible to fuel source (Diesel Fuel tank, Natural Gas primary regulator, or LPG tank). Allow at least 1½ feet clearance room around generator compartment for maintenance, servicing and repair, and for hot air discharge from engine.

**GENERATOR BASE MOUNTINGS:** The generator enclosure should be mounted to a cement slab or other sturdy and rigid base (not the ground) using anchor bolts of sufficient length to insure a tight, secure retention of the unit. The base should be 3-4 inches thick and extend slightly beyond all four sides of compartment. Be sure that base is level so that generator set is perfectly level.

## WIRING CONNECTIONS FOR SENTRY-PRO GEN-SETS

This generator set has been factory run with both no load and full load tests. This run test is approx. 1/2 - 1 hour in duration so that all tests and final adjustments can be made. The engine is not yet "Broken-In" at this point, an additional 50 to 100 hours will be required for final break-in, to develop full performance.

**SENTRY-PRO ELECTRIC LOAD CONNECTIONS:** The generator has a pre-wired load terminal strip, #TS-3. You will notice, a circuit breaker is installed on all KW sizes 7.5 thru 15.0 KW 3600 RPM sets, as standard equipment. On units of 1800 RPM, 15 KW & higher plus all 3 phase sets, the circuit breaker is optional. If you have chosen our optional circuit breaker you will notice it is a choice to have it shipped loose for custom installation by licensed electrician, or to have factory installation and wiring on gen-set, for an additional list price adder.

### ELECTRIC LOAD CONNECTIONS FOR BOTH HOUSED AND OPEN SETS:

#### STEP 1:

The generator has a pre-wired load terminal strip number TS-3 on load side of circuit breaker. A licensed electrician should connect load wires of suitable size and insulation in proper conduit to the selected electric load utilizing all proper electric components and safety devices as outlined in NEC code book. Attach the load wires on load side of circuit breaker to load terminal strip TS-3 using connection lugs marked E1, E2 and N respectively (or E1,E2,E3 and N for 3 phase) along with generator's neutral wire as shown on schematic in back of book. Route these wires by shortest path to the same identical numbered connection lugs E1, E2 and N respectively (or E1,E2,E3 and N for 3 phase) located in the transfer switch panel. Note: Neutral should be grounded when generator is used as a prime power set and not grounded when used as a standby set. See "Grounding the Generator Frame".

**NOTE:** Neutral wire is not to be grounded anywhere at the generator set if it is to be used as emergency standby to utility power. See "Grounding the Generator Frame".

**STEP 2:** Connect the utility normal power supply with

**CAUTION** All SENTRY-PRO SETS HAVE AN UNGROUNDED NEUTRAL. IF THE GENERATOR SET NEUTRAL BECOMES GROUNDED WITHIN ITS OWN FRAMEWORK, ANY SHORTED CONDITION MAY RESULT IN DAMAGE TO THE ENTIRE GENERATOR SET. FOR THIS REASON, GROUNDING OF THE NEUTRAL IS RECOMMENDED ONLY AT THE MAIN ELECTRICAL SERVICE ENTRANCE, FOR ALL STANDBY EMERGENCY POWER SYSTEMS.

approved electric wiring through a main line circuit breaker of proper amperage rating to connected lugs numbered N1 and N2 located in the transfer switch panel. Also, utility neutral wire should be connected to neutral Lug N located in transfer switch panel, but not to transfer switch ground.

**STEP 3:** Connect the electric load with approved electrical wiring from distribution panel to numbered lugs T1 and T2 (T1,T2,T3 for 3 phase) located in transfer switch panel. Also, distribution panel neutral wire should be connected to neutral lug N located in transfer switch panel. This concludes the steps to connect electric load connections. All wiring must be of approved insulating qualities, properly supported, and installed in approved electrical conduit. A flexible length of conduit must be used between the generator set and rigid conduit to prevent breakage if generator vibrates, shifts or settles. The generator set may or may not have its own main line circuit breakers. A circuit breaker or safety switch is also required in the utility power supply. It is important to discuss the type of electric load and how it is to be connected to the transfer switch load. The manufacturer recommends the "chosen circuit" method. To do this, the installer must select only the electric loads that must be powered by the generator set during a loss of normal utility power. This selection of "emergency loads" must never have its total power in watts exceed 75% of the wattage rating of generator or transfer switch. With this method, the generator cannot be overloaded by allowing the operator to continually add loads.

**GROUNDING THE GENERATOR FRAME:** The National Electrical Code, Article 250-5, requires that the generator metal frame be properly connected to an approved earth ground. Local electric codes may also require proper grounding of the generator frame. For this grounding purpose, a special "ground" point is provided inside compartment and on generator set. For a separately derived system where there is no direct connection (including the neutral) to utility power, approved grounding is achieved by connecting a suitable length of #6 gauge stranded copper wire to an earth driven copper or brass rod (grounding electrode). For a system that is not separately derived, (Sentry-Pro sets) where the neutral ties to the utility company neutral, a separate ground conductor should be run from the generator to the transfer panel and from the transfer panel to the main distribution panel ground. This means that the neutral is only grounded at distributor panel. Proper grounding will reduce the risk of an electric shock in the event of a ground fault condition in the generator or electrical components. Grounding of component metal parts also helps reduce static electricity which often builds up in ungrounded neutral equipment. Always consult local, certified electrician for proper and safe grounding procedures.

**⚠ DANGER LOCATE THE "MODE SELECTOR" SWITCH MOUNTED INSIDE GENERATOR ON THE CONTROL PANEL AND MAKE SURE ITS IN "OFF/RESET" POSITION. BY FOLLOWING THESE PRECAUTIONS, THE ENGINE WILL NOT TRY TO START WHILE INTER-CONNECTION WIRING WORK IS IN PROCESS.**

**⚠ DANGER THE 12 VDC BATTERY SHOULD NOT BE INSTALLED AT THIS TIME. DO NOT ATTEMPT ANY CONTROL LEAD CONNECTIONS UNTIL YOU ARE SURE THAT BATTERY IS NOT INSTALLED AND THAT BATTERY CABLES (BOTH POSITIVE AND NEGATIVE) ARE NOT CONNECTED. IF BATTERY IS CONNECTED, THE ENGINE MAY BEGIN TO START DURING INTERCONNECTION WIRING WORK**

**(C) LOAD WIRES**

Each generator model will be of a different KW size, which then will produce a different amount of full load amps. Verify the load amps on the generator specification tag. Multiply this amperage by 125% and select a wire gauge size to carry this new amperage rating. Example: A 12.0 KW gen-set on LPG fuel, produces a name plate rating of 46 amps.  $46 \text{ A.} \times 125\% = 58 \text{ Amps.}$  A 12 gauge wire will safely carry this current up to 25 feet. We recommend the use of "TIN" stranded and insulated wire for the best current carrying ability.

The length of wire will also effect the final wire gauge size. Always rely on a Licensed Electrician to make these important and critical decisions.

All SENTRY-PRO engines have a complete supply of engine crankcase "break-in" oil. Change this oil after the first 25 hours of operation. All liquid cooled engines contain a 50/50 mixture of water/anti-freeze, sufficient for normal operation.

**CONSULT INSTALLATION GUIDE FOR FULL INFORMATION ON PROPER INSTALLATION.**

**BATTERY INSTALLATION**

An automotive type battery must be furnished by the installer. See chart (on page 13) for a listing of gen-sets in KW sizes and the corresponding minimum starting battery size. Note the dividing line where smaller size battery cables will have ring terminals and mounting hardware attached and larger size batteries will have round-type post connectors attached. **Be sure to purchase the correct battery that matches cable connectors.** The battery must be properly serviced with electrolyte fluid and fully charged before installation. Connect the positive (+) battery cable to the battery post indicated by (POS) or (+) or red cable. Connect the negative (-) battery cable to the battery post indicated by (NEG) or (-) or black cable. Cable connections to battery must be clean and tight.

At this point, all components are installed, fuel is connected, and all wiring is completed. The standby generator is ready to use.

**⚠ DANGER DURING BATTERY CHARGING AND NORMAL BATTERY OPERATION, HYDROGEN GAS IS FORMED IN EACH CELL. THIS HYDROGEN GAS MAY BE EXPLOSIVE IF IGNITED. NEVER BRING BURNING MATERIALS SUCH AS CIGARETTES, LIGHTED MATCHES, HEATERS OR SPARKS AND FLAMES OF ANY KIND NEAR THE BATTERY.**

**CONTROL WIRING INTERCONNECTION FOR SENTRY-PRO :** There will be one set of control wires to connect. A total of up to (5) control wires from Transfer Switch Panel Terminal Strip to Generator control Panel (#TS1 Terminal Strip). These control interconnecting wires must be run in approved and supported electrical conduit *that is separate from the A-C load power conduit.* SEE SENTRY-PRO INTERCONNECTIONS FIG. 3.

**INTER-CONNECTING CONTROL WIRES FOR SENTRY-PRO (TO IT'S AUTOMATIC TRANSFER SWITCH, TO IT'S OPTIONAL MANUAL TRANSFER SWITCH, OR REMOTE START-STOP PANEL)**

It is most important to use **STRANDED WIRE ONLY** of the proper gauge for control connections between the transfer switch or any other control device, and the generator set. Electric power for 12 VDC controller functions will diminish fast as the length of wires increases. This increase in "wire voltage drop" may cause your system to be erratic or not function at all. Keep the distances between the two components (generator control panel and transfer switch) short (up to 100 ft.) and follow recommended minimum wire gauge as shown on chart of FIG. 3. **DO NOT INSTALL A SYSTEM THAT HAS CONTROLLER (TRANSFER SWITCH) AND GENERATOR SET, THAT IS MORE THAN 100 FEET APART.** Always run load wires in separate metal conduit and control wires in their own metal conduit. Ground each conduit fitting to the internal "straight through" ground circuit of the complete system.

**SENTRY-PRO INTERCONNECTIONS FIG. 3**

| CONNECTION POINTS FOR CONTROL WIRES | UP TO 50 FT. | 50 FT. TO 74 FT. | 75 FT. TO 100 FT. | LENGTHS OVER 100 FT. ARE NOT RECOMMENDED |
|-------------------------------------|--------------|------------------|-------------------|------------------------------------------|
| TERMINALS TS1 TO TRANSFER SWITCH    | 14 GA.       | 12 GA.           | 10 GA.            | HEAVIER WIRE GAUGE IS NOT RECOMMENDED    |

**⚠ DANGER BE EXTREMELY CAREFUL. YOU ARE READY TO TEST RUN A GENERATOR THAT HAS BOTH ELECTRIC SHOCK AND FLAMMABLE FUEL POTENTIAL HAZARDS. CHECK AND REVIEW ENTIRE INSTALLATION BEFORE START-UP.**

**⚠ CAUTION MAKE SURE THAT RATING OF TRANSFER SWITCH, MATCHES OR IS GREATER THAN THE RATING OF THE EMERGENCY GENERATOR, IN VOLTS, PHASE, AND FREQUENCY. MIS-MATCHED SPECIFICATIONS WILL CAUSE EQUIPMENT DAMAGE.**

Following is a review of the most popular gen-set optional equipment:

**OPTIONAL BATTERY CHARGER**

The automatic battery charger PART NO. S-16A, is furnished as optional equipment, for all 3600 RPM sets. Automatic battery charger PART NO. S-16B, is also furnished as optional equipment but designed to operate only on 1800 RPM sets. The standby gen-set must have a fully charged starting battery at all times, so that engine can start quickly. However, these chargers are treated as optional equipment as many users prefer to supply their own. Whenever selected, the S-16A charger is normally installed on the control panel located inside the generator enclosure or on gen-set base for "open" gen-sets. Its 120VAC side is wired to a terminal strip TS-2 located in the AC connection box near the generator end of the gen-set. This terminal strip is then wired by the installer to a 120 volt utility source. The DC side of the battery charger is then hard-wired to the starting battery of gen-set. Charger S-16B are directly wired to a commercial 120 VAC source by the installer. Both chargers are of the automatic float charge design and is capable of charging Nicad, lead acid, sealed or gel type.

**OPTIONAL ENGINE WATER HEATER  
(LIQUID-COOLED 1800 RPM ENGINES ONLY)**

The automatic electric engine block water heater is furnished as optional equipment. When selected, this heater is

installed in the cooling system and controlled by an automatic thermostat. The heater is energized by a utility, 120 VAC source (installer provided) and keeps the engine warm on standby duty.

**OPTIONAL ENGINE CRANKCASE HEATER  
(AIR-COOLED, 3600 RPM ENGINES ONLY)**

The automatic low wattage oil heater is furnished as optional equipment for all smaller air cooled standby gen-sets. When selected, this heater is installed in the oil system and controlled by an automatic thermostat. The heater is energized by a utility, 120 VAC source (installer provided) and keeps the engine warm on standby duty.

**OPTIONAL BATTERY HEATER**

The automatic electric battery heater is furnished as optional equipment. When selected, this heater is furnished loose for installer to wrap around the engine starting battery (furnished by others) and controlled by an automatic thermostat. The heater is energized by a utility, 120 VAC source (installer provided) and keeps the battery warm for full battery power and fast engine starts.

**U.L.-142 CERTIFIED DIESEL FUEL TANKS**

A group of metal fuel tanks are available for all 1800 RPM diesel driven gen-sets, to provide 24, 48 and 72 hour extended run time before refueling. The gen-set mounts exactly on top of these tanks for a compact assembly. Both standard single wall and "leak-proof" double wall tanks are available.

*Note: We have mentioned only these (5) optional equipment items that can be installed in the "field" if item was overlooked.*

**PREVENTATIVE MAINTENANCE**

**1. STARTING BATTERY:** It is vitally important to select the proper battery so that your generator set can start and operate at peak efficiency. The following are minimum recommendations for 12 VDC and 24 VDC batteries with negative ground.

|                                                                  | GEN-SET KW SIZE RANGE | BCI GROUP | PHYSICAL SIZE OF STARTING BATTERY |         |        | COLD CRANKING AMPS (C.C.A.) | RESERVE CAPACITY MINUTES | AMP-HOUR CAPACITY |
|------------------------------------------------------------------|-----------------------|-----------|-----------------------------------|---------|--------|-----------------------------|--------------------------|-------------------|
|                                                                  |                       |           | LG.                               | WI.     | HI.    |                             |                          |                   |
| FURNISHED BATTERY CABLES WITH RING TERMINALS                     | 7.5 KW THRU 12.0 KW   | 21        | 8 3/16                            | 6 13/16 | 8 3/4  | 310 - 400                   | 50 - 70                  | 45                |
|                                                                  |                       | 21R       | 8 3/16                            | 6 13/16 | 8 3/4  | 310 - 400                   | 50 - 70                  | 45                |
|                                                                  |                       | 26        | 8 3/16                            | 6 13/16 | 8 3/4  | 310 - 400                   | 50 - 80                  | 45                |
|                                                                  | 12.5-15 KW            | 26R       | 8 3/16                            | 6 13/16 | 7 3/4  | 405 - 525                   | 60 - 80                  | 55                |
| FURNISHED BATTERY CABLES WITH TERMINALS FOR ROUND POST BATTERIES | 17.5-42 KW            | 56        | 10                                | 6       | 8 3/8  | 450-550                     | 90-100                   | 75                |
|                                                                  | 45-80 KW              | 64        | 11 11/16                          | 6 3/8   | 8 7/8  | 475-535                     | 105-120                  | 85                |
|                                                                  | 100-200 KW            | 65        | 12                                | 7 1/2   | 7 9/16 | 650-850                     | 130-165                  | 100               |

Note: Some gen-sets require special battery treatment: A 24 VDC starting system may be used on some larger KW models. This requires (2) 12 vdc batteries of sufficient size connected in series to achieve correct voltage and CCA size. Some models require large CCA size at 12 VDC. This requires (2) 12 VDC batteries connected in parallel to achieve double the amount of CCA cranking power.

Battery sizes can be determined by (3) methods: BCI Group, Cold Cranking Amps, or Amp-Hour Capacity. Chart shows minimum recommended battery size for each generator KW size. Generator sizes 7.5 thru 15 KW has furnished battery cables with ring terminals and hardware to bolt to battery posts of design type T, L, U, X, or Z. Generator sizes 17.5 KW thru 200 KW have battery cables with type A-SAE Automotive type connectors to fit batteries with round type posts.

**CAUTION** NEVER OPERATE THE ENGINE WITH OIL LEVEL BELOW THE "ADD" MARK, OVER THE "FULL" MARK, ON DIPSTICK, WITHOUT DIPSTICK OR OIL CAP IN PLACE. THESE ACTIONS WILL RESULT IN DAMAGE TO THE ENGINE.

**2. LUBRICATION OIL:** This generator is protected with a special low oil shutdown sensor. If oil level is neglected and reaches a low point where it endangers the engine, the system will shut down. A fault light will show on the SENTRY-PRO display panel. You must replace oil to "FULL" mark on dipstick, reset the **MODE SELECTOR** switch to the **OFF/RESET** position momentarily and then return it to the desired position of operation, on the control panel. Engine will crank and start, after controller is reset.

**NOTE:** Always remember that after any fault shutdown you must always reset the **MODE SELECTOR** switch on the gen-set control panel to the **OFF/RESET** position momentarily and then return it to the desired position of operation.

**3. CHANGE ENGINE OIL:** It is recommended to change the first oil after about 25 hours of operation. Regular scheduled oil changes should be after every 100 operational hours. To change or check level of oil: Run engine for about 10 minutes to warm up the oil. To run engine, move the "ENGINE TEST SWITCH" to the "RUN" position. After 10 minutes, shut the engine down by returning this switch to the "STANDBY" position. Now you must be sure to shut down all switches and power that are described in previous warnings to prevent automatic start-up. Drain all oil from engine crankcase and secure all drain plugs. refill with proper recommended oil and replace oil fill cap.

**NOTE:** Always remember that after any fault shutdown you must always reset the **MODE SELECTOR** switch on the gen-set control panel to the **OFF/RESET** position momentarily and then return it to the desired position of operation.

**4. CHANGE ENGINE OIL FILTER:** Remove and replace engine oil filter every 200 hours of operation. Before installing new filter, lightly coat the filter seal with engine oil, screw the filter on by hand until seal firmly seats into filter adapter. Use special filter wrench (found in any auto store) and tighten 1 1/4 - 1 1/2 turns more. Check for leaks around area after engine is running.

**5. INSPECT AND/OR CHANGE AIR CLEANER:** There are several different engines used in the various sizes of standby generator sets. The separate engine manual will

give specific instructions on the engine air cleaner maintenance. The air cleaner is usually made up of two elements: a foam pre cleaner and a paper filter. Remove the complete air cleaner assembly. Wash the foam pre cleaner in kerosene or liquid detergent and water every 25 hours of operation. Wrap foam cleaner in cloth and squeeze dry. Saturate foam cleaner in engine oil and squeeze out excess oil. Replace foam pre cleaner. Clean or replace main paper filter if it is extremely dirty or has over 100 hours. Some larger engines have special oil bath air cleaners. Follow engine manual instructions for cleaning these air cleaners.

**CAUTION** DO NOT APPLY ANY CLEANING SOLVENTS OR OIL TO PAPER FILTER FOR ANY REASON. DO NOT USE COMPRESSED AIR TO CLEAN PAPER FILTER.

**6. STARTING BATTERY:** The battery is not included with this stand-by system. Care must be taken to select the right size and to install it properly. Inspect the starting battery every 25-50 hours of operation. Check the fluid level in each cell (if battery is of non-sealed design). Add **ONLY DISTILLED WATER** to cell level. **DO NOT USE TAP WATER IN BATTERY.** Inspect battery posts and clean away any dirt or corrosion. Make sure all cable connections are clean and tight. Coat connections with a light layer of general purpose grease. Every six months, use an automotive type battery hydrometer and test the battery charge condition. A battery should be fully charged when the specific gravity of its electrolyte acid is 1.26 when measured with the hydrometer. The battery is only 75% fully charged if hydrometer reading is 1.23 specific gravity and less than 50% charged at 1.2 specific gravity. If battery is not fully charged, remove it from the system and use an automotive type slow charger to bring it to 100% full charge.

Note: If battery is charged to only 60% of full charge or to only 8.5 volt, an external type automatic trickle charger may not work, and battery will eventually become completely discharged.

**DANGER** BATTERY ACID IS A CAUSTIC, SULFURIC ACID THAT WILL CAUSE SEVERE BURNS TO EYES, SKIN AND CLOTHING. IF CONTACT WITH THIS ACID OCCURS, FLUSH CONTAMINATED AREAS IMMEDIATELY WITH CLEAR WATER AND CALL A PHYSICIAN.

**7. ENGINE COOLING SYSTEM:** Small engines are air-cooled. However, larger KW standby generator sets are liquid cooled, using an engine mounted radiator. Once each month, inspect all inlet and outlet cooling air passage ways. Remove any obstructions that have accumulated. radiators and engine blocks are filled with a 50% mixture of water and anti-freeze solution. Check radiator for full level. Check overflow bottle, piping, radiator for possible leaks. If environment is dirty (cement quarries, saw mills, desert area, etc.) the standard radiator may often become clogged. An anti-clog radiator can be "field" installed.

## SENTRY-PRO NORMAL MAINTENANCE

This standby generator set will require periodic maintenance. The Run Time Meter, will allow a schedule for regular maintenance checks. The single phase generator has no brushes, slip rings, commutator or any other wear items. Therefore, the generator is virtually maintenance free and needs no periodic replacement of parts or adjustments. However, the engine requires specific & regular attention, as shown in it's owner's manual.

It has been proven by past test results that constant attention to preventative maintenance care will add tremendous additional service hours to your stand-by generator set. Always follow recommended service inspections to your engine and generator, as shown in both this guide and your engine service guide, giving particular emphasis on replacing oil and air filters, and engine oil changes. Also, inquire from your distributor where qualified service and preventive maintenance service may be obtained

**1. FOR THREE PHASE GENERATORS ONLY:** These windings may be installed in your generator set. If so, special instructions and prints will accompany the unit. It is important to know that for these generators there is a voltage regulator board and a fuse located in the generator control panel. This fuse must be inspected regularly.

**2. ENGINE OIL:** Refer to separate engine manual for recommended oils and capacities. Engine oil level should be checked every 10-15 hours or at least once a month, whichever may occur first. Oil level should always be at the dipstick "FULL" mark.

**DO NOT OVER FILL ABOVE FULL MARK.** It is recommended to use Mobile 20 WT "Synthetic" lubricating oil in your air cooled engine crankcase, when dry fuel carburetion is used. This gives better starting in cold winter climates.

**NEVER OPERATE THE ENGINE WITH OIL LEVEL BELOW THE "ADD" MARK, OVER THE "FULL" MARK, ON DIPSTICK, WITHOUT DIPSTICK OR OIL CAP IN PLACE. THESE ACTIONS WILL RESULT IN DAMAGE TO THE ENGINE.**

**8. COMPLETE SYSTEM INSPECTIONS:** At least every six months, inspect entire system for leaks, damage, wear, and any changes from original installation. repair any discrepancies immediately.

**9. SPARK PLUGS:** It is important to know that when replacing spark plugs, they must be re-gaped to different dimensions for dry fuel operation: Vanguard 18 HP = .020 in. plug gap; Kohler 25 HP = .020 in. plug gap; all G.M. Vortec engines = .035 in. plug gap; An "over the counter" spark plug for gasoline fuel, usually has a .030 gap.

**ENGINE GOVERNOR ADJUSTMENTS** are factory set and do not require any further adjustments. However, if these

settings are disturbed, damaged and/or wear results in a misjudgment, a qualified and experienced engine repair person should make the replacements, repairs, or re-adjustments. No other adjustments are required.

### EFFECTS ON ENVIRONMENT

Installation of outside generators can have performance effected by adverse environmental conditions. Following are a few (but not all) conditions that can effect engine and generator performance.

**1. HIGH HUMIDITY AND CONSTANT MOISTURE:** The generator copper windings are insulated from moisture by an encapsulating electrical grade varnish. However prolonged water exposure will eventually cause problems.

**2. SALT AIR FROM OCEAN SITES:** The salt air is detrimental to painted metal, plated hardware, electrical components and copper windings. Extra maintenance and problems will occur.

**3. DIRTY, DUSTY AREA:** Installation sites such as close to well-traveled dirt roads, cement factories, grain bins, and other dusty areas will soon cause operational problems with the system.

**4. HIGH TEMPERATURE:** Extreme high temperature will cause a derating of generator output. Always try to locate generator set in a continuous shady area.

**NEVER OPERATE STANDBY SYSTEM WHEN TEMPERATURE EXCEEDS 105°F. REDUCE GENERATOR WATTS BY 1% FOR EVERY 10°F RISE ABOVE 77°F.**

**5. COLD TEMPERATURE:** Dry gaseous fuel is designed for vapor withdrawal LPG fuel. When ambient temperature is -10° F. (below zero or cooler), this LPG vapor withdrawal fuel will not operate efficiently and may cause erratic or no operation. Natural gas fuel and diesel fuel are not affected until temperature reaches -25° F. (below zero).

**6. HIGH ALTITUDE:** Reduce generator watts by 3 1/2% for every 1000 feet over 328 feet above sea level.

## SAFETY IN REVIEW:



**A.** Guard yourself against electric shock; avoid personal contact with live terminals, wires and receptacles. The electric output voltage in your generator can produce a fatal shock. In case of electrical shock, shut down the source of electric power. If this is not possible, free the victim from source of electric by use of dry wood, dry rope or any other such non-conductive device. **AVOID ANY DIRECT CONTACT WITH VICTIM OR LIVE ELECTRIC POWER.** If victim is semi or totally unconscious, apply CPR and call for medical help.





**B.** If adjustments must be made while generator set is running, use extreme caution around hot manifolds, hot mufflers, and moving parts.



**C.** Keep your hands, hair or loose clothing away from moving parts.



**D.** Operation of this set in an enclosed compartment of a recreational motor home, of other types of vehicle compartment, enclosed space or poorly ventilated area, is not recommended and will cause a potential fire hazard and/or personal health or death hazard by poisonous fumes.



**E.** All fuels will always present a hazard of explosion or fire. Keep an "ABC" rated fire extinguisher close by generating set, and consult local fire department on handling and storage of dangerous fuels.



**F.** Battery acid can produce skin, eye, and clothing damage. Batteries emit a hydrogen gas when being charged. This gas is poisonous and highly explosive. Use extreme caution when handling batteries.



**G.** California proposition 65 warning: This is a warning to user that all exhaust fumes from this engine contain chemicals known to cause cancer, birth defects, or other reproductive harm. Do Not Breathe poisonous engine exhaust fumes.



**H.** All wiring must conform to the NEC, national electric code as well as state and local codes when using generating set as emergency home or business standby power set. You must consult and employ a qualified licensed electrician for safe, hazard and shock-proof installation. Installing a home or business emergency power system to your existing wiring circuits is not a "do-it-yourself" project.



**I.** User must supply battery for energizing engine electric starter motor. Be sure battery connections are of correct polarity. All electric start engines use negative ground, 12 V DC battery cables are supplied and connected. A battery size chart, showing sizes in both amp-hours and cold cranking amps, is located within this manual and on battery mounting tray. When connecting or disconnecting battery cables, engine must not be running or cranking.



**J.** Before transporting generator in vehicle, drain or run out all fuel. This prevents possible fuel leakage.



**K.** Engine should be refueled in a well-lighted area. Avoid fuel spills. Do not operate generator set where fuel spills have occurred until all excess fuel is cleaned up and removed. Avoid refueling near open flames, sparking electric devices, power tools, other high heat conditions or while the set is running.



**L.** Good ventilation is mandatory for safe generator operation. Avoid areas when fuel vapors and exhaust gases can be trapped: basements, boat bilges, compartments, garages, etc. Proper air flow and temperatures are important for safe operation of air-cooled sets. Never operate generator set when ambient temperature exceeds 105° F.



**M.** Muffler and air cleaner should always be installed and in good condition. They act as a flame arrestor if backfiring occurs.



**N.** A spark arrestor muffler must be used when gen-set is operated around or near flammable materials such as farm crops, grain dust, forests, brush, dry grass, and other similar flammable items to help prevent fires caused by potentially hot engine carbon sparks exiting through muffler. California statutes #134005(6), 442, and 443 legally require the use of this item on all portable gen-sets. It is required on all U.S. Forest Service lands and may also be required by various other states' statutes and ordinances.



**O.** Occasionally, the engine manual, will contradict, the operation instructions of this manual. When this happens, your standby gen-set will carry a caution hang tag, explaining proper methods of operation. A common generic statement of engine manuals when describing general use, is that of "Always reduce engine speed before starting". This is wrong for generator use. *Never tamper or change engine governor setting.*



**P.** Always read engine manual thoroughly before initial start of your new gen-set. The engine is not considered broken-in until 40-50 hours run time has passed.

## STANDARD ONE YEAR LIMITED WARRANTY FOR STANDBY AND PRIME POWER SYSTEMS

For a period of one (1) year from date of original installation to original user, or 18 months from date of manufacture, or 1000 hours of operation (*whichever comes first*), Gillette will repair or replace, at its option, any part that may be of defective or questionable material or workmanship, which upon examination by Gillette, or Gillette's nearest authorized Warranty Service station, proves to be defective under normal use and service.

All transportation charges are at the expense of user. All materials and parts sent to the factory or service station and all returns of materials and parts, to the user, must have freight charges prepaid by the user.

### YOUR STANDBY WARRANTY SHALL APPLY TO:

(A) Mileage allowance is limited to a total of 100 miles and a total of 2 1/2 hours driving labor (based on average speed of 40 mph) and is re-imbursed by Gillette to repair station at the rate of \$.25 per mile and \$18.00 per hour. This can be many repair trips, but is strictly limited to 100 total traveled miles.

(B) Actual repair labor rate is \$45.00 per hour and is governed strictly by the (10) repair steps and the allotted time for each sequence of consecutive repair steps needed to finalize repairs. Request Standby warranty repair form, before proceeding with warranty repairs.

(C) All warranty allowances and limitations are defined by Gillette's Standby warranty policy.

### THE STANDBY WARRANTY SHALL NOT APPLY TO:

(A) Failures due to mis-application, improper and faulty installation, abusive environmental conditions such as a build up of snow, leaves, ice, floods, heat, sprinkler heads, inside of closed building or other such non-standard conditions.

(B) Failure due to normal wear such as batteries, light bulbs, engine oil, air and fuel filters, brushes, etc., all of which is considered normal wear items.

(C) Products that have been modified by others from original factory design.

(D) Costs of maintenance, normal adjustments, original installations, over time charges on any type penalty clauses incurred by others.

(E) Loose wire connections, loose screws or hardware, loose fuel connections, engine adjustments, wrong fuel input (4oz. pressure into a 6oz. secondary regulator, or vice versa), or any other such happenings that is normally found and corrected during pre-sale, installation or standard start-up procedures. **THESE ITEMS ARE PART OF STANDARD START-UP PROCEDURE AND ARE NOT WARRANTABLE SERVICE WORK.**

(F) Any type of communication costs.

(G) Rental equipment while warranty repairs are being performed.

(H) Travel expenses during performance of warranty service.

(I) Incidental, consequential or any indirect damages caused by defects in repair or replacement of defective parts or workmanship.

(J) Components not of Gillette's original manufacture. The engine and other non-Gillette manufactured items, must be covered by their manufacturer's specific warranty. Gillette will help in the expediting of such warranties, but can not intercede or change the warranty policy of such separate manufacturers. Costs of transportation and incidental charges, to and from designated repair stations are at the expense of user.

(continued)

(STANDARD WARRANTY CONTINUED)

(K) Failure on initial start up or during the initial operational period, WHEN NON-EXPERIENCED AND NON-QUALIFIED INSTALLERS ARE USED. Gillette will inquire upon each warranty claim, as to who was the installer. Experienced fuel installers and licensed electricians must be used. Layman installers will automatically void all warranties.

This listing is not all inclusive and is not intended to list all possible non-warranty situations. The best guide to a warrantable item is that it must prove to be of a defective material or poor workmanship.

LIMITATION OF LIABILITY To the extent allowable under applicable law, Gillette's liability for consequential and/or incidental damages is expressly disclaimed; even if such damages are a direct result of GILLETTE product or negligence. GILLETTE'S liability in all events is limited to and shall not exceed the purchase price paid to the original buyer. Buyer and/or user agree to make no claims against GILLETTE based on any type of GILLETTE product or negligence other than normal expressed limited warranty coverage.

WARRANTY DISCLAIMER: GILLETTE has made a diligent effort to illustrate and describe the products in its literature accurately. However, such information is for the sole purpose of identification and does not express or imply a warranty that the products are merchantable; fit a particular purpose or that the products will necessarily perform to the illustrations and descriptions. Except as provided, no warranty or affirmation of fact, expressed or implied, other than stated in "Limited Warranty" above is made or authorized by GILLETTE.

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# IMPORTANT LPG OR NATURAL GAS FUEL CONSIDERATIONS FOR SP, SP2, & SP4 7.5 THRU 125 KW

**NATURAL GAS FUEL AND LPG (PROPANE) GAS FUEL SYSTEMS:** Always plan the fuel system before starting actual work. The following information is provided as a help to the qualified gas fuel installer in laying out a plan. In no way should this information be understood to conflict with existing local, state or national fuel gas codes which may differ from information in this manual. Consult your gas supplier, local fire department, or fire marshall if questions arise.

**DANGER** GAS VAPOR AND FUELS ARE HIGHLY EXPLOSIVE. THE SMALLEST SPARK WILL RESULT IN FIRE OR EXPLOSION. ALL APPLICABLE GAS FUEL CODES, REGULATIONS, AND STANDARDS MUST BE STRICTLY FOLLOWED FOR SAFE INSTALLATIONS. GAS FUEL PIPING AND COMPONENT ASSEMBLY SHOULD BE DONE ONLY BY A QUALIFIED, EXPERIENCED AND COMPETENT GAS FUEL TECHNICIAN.

A drawing is located in this manual that shows a typical dry gas fueled engine system. The engine mounted secondary gas regulator will regulate the gas flow by responding to pressure changes in the intake system of the engine. When the engine is shut down and there is no demand for fuel, this "demand" KN regulator stops all gas flow. The I2 VDC fuel solenoid valve is installed as a second method of a positive fuel shut-off device. This method of positive shut-off is a requirement of many local codes in many States. Always install a manual shut-off valve in fuel line.

## Following are important points for gas fuel installations:

- ♦ Rigid gaseous fuel piping should be of black iron, properly installed and supported. **DO NOT USE GALVANIZED PIPING.** The galvanized coating will flake off and may clog regulator, fuel line or engine carburetor. **DO NOT USE COPPER PIPING, UNLESS IT IS APPROVED IN YOUR LOCAL CODES.** Different alloys of copper may become "work hardened", brittle, and may crack or break. Support all piping runs so that vibration is not allowed to shake piping.
- ♦ The cubic inch displacement of engine and the length of fuel feed line run will determine diameter of fuel feed line. A chart is located in this manual for easy calculation of fuel line diameters.
- ♦ Always run a dedicated fuel line from the source of fuel directly to the engine input. Never tap off of an existing fuel line that serves other purposes.

♦ LPG (propane) fuel will operate from a fuel tank supply. This tank must be of vapor withdrawal design (not liquid withdrawal) for all engine horsepower ratings of 70 HP and smaller. A primary regulator that is factory set at **6 OUNCE PRESSURE (11 INCHES WATER COLUMN)** must be installed at outlet of LPG tank.

**CAUTION** FULL TANK PRESSURE RESULTING FROM EITHER WRONG OR NO PRIMARY REGULATOR ON LPG (PROPANE) TANK WILL CAUSE DAMAGE TO ENGINE MOUNTED SECONDARY REGULATOR AND MAY DO DAMAGE TO OTHER COMPONENTS.

## REVIEW OF IMPORTANT POINTS ON DRY FUEL GENERATOR SETS


1. Always install a flexible fuel line of at least 350 psi rating from the engine mounted shut-off valve to the fuel line, to avoid damage from the engine vibration.
2. Purchase NFPA style LP tank and primary (tank) regulator from reliable sources of gaseous fuel supply. Tank mounted primary regulator must deliver 6 ounces to engine mounted secondary regulator. Give your tank supplier all the information available and inquire as to size of tank needed for proper operation of your engine.
3. The use of wrong fuel (liquid withdrawal LPG) other than vapor withdrawal LPG will result in frosting of components and either erratic or no operation.
4. All Natural Gas fuels will derate normal engine horsepower (horsepower rating with gasoline fuel) by 20%. Manufactured gas will derate horsepower by 50%. Different mixtures of LPG could derate HP by 3 to 10%. These same derations are in direct proportions to gen-set wattage output.
5. If engine becomes erratic in operation or will not start, the problem is usually one of the following: Wrong fuel, low fuel in tank, fuel feed line is too small, tank size too small, air leak in fuel line, defective secondary regulator, wrong primary regulator or load screw is out of adjustment. To sum up: Besides a sensitive secondary regulator, an accurate and constant fuel pressure leading from LPG tank into secondary regulator is mandatory. In remote tank supplied LPG system, a primary tank mounted regulator feeds the secondary regulator a constant 6 ounce (11 inch water column) pressure, regardless of tank pressure or flow. Most natural gas installations have a constant regulator supplied by the gas utility which eliminates the need to supply primary regulator.


**REGULATOR OPERATION:** The demand or secondary engine mounted regulator in most systems regulates the gas flow by responding to pressure changes in the intake systems of the engine and smoothes these changes into a constant, even flow to the carburetor. When the engine is shut-down with no demand for fuel, the regulator will prevent gas flow. An additional electric fuel solenoid is added to provide a second means of stopping fuel flow, for additional safety.

**HOW TO START AND STOP THE ENGINE WITH DRY FUEL:** It is important to know that you should never stop the engine by any other means than turning the gaseous fuel off. SENTRY-PRO has purposely taken any means off the engine that would allow the operator to stop engine by grounding out the magneto or the battery ignition system. Also, manually "choking" the engine when using a gasoline fueled engine, is a normal practice, but this choking action should never occur when dry fuel is used; as a fuel build-up in engine combustion area, may result in an exhaust system fire. For this reason, your engine is specially modified so that it can never be choked.

This system was fully load tested on 6 ounces pressure for either LPG fuel with vapor withdrawal system or natural gas fuel, depending on the fuel specification of original factory order. Most installation problems are due to errors in the fuel system. Following are common installation mistakes:

- A. Either no regulator or wrong regulator on LPG tank. Engine will not start, and secondary regulator may be damaged.
- B. Fuel feed line too small causing a "starving" fuel condition. Engine may not start or won't pull a full load.
- C. Using small 20, 40, or 60 pound LPG tank will cause "starving" fuel condition and engine will run erratic. Always use minimum 100 pound tank, for up to 12kw, 500 pound tanks for up to 65kw, 1000 pound tanks and higher, for larger kw sets.
- D. Never tap off of existing natural gas line that may feed a furnace and hot water heater. This causes a "starving" fuel condition when other items operate. Engine will run erratic.
- E. Use of liquid withdrawal LPG tank rather than vapor withdrawal will cause erratic operation and fuel line frosting.

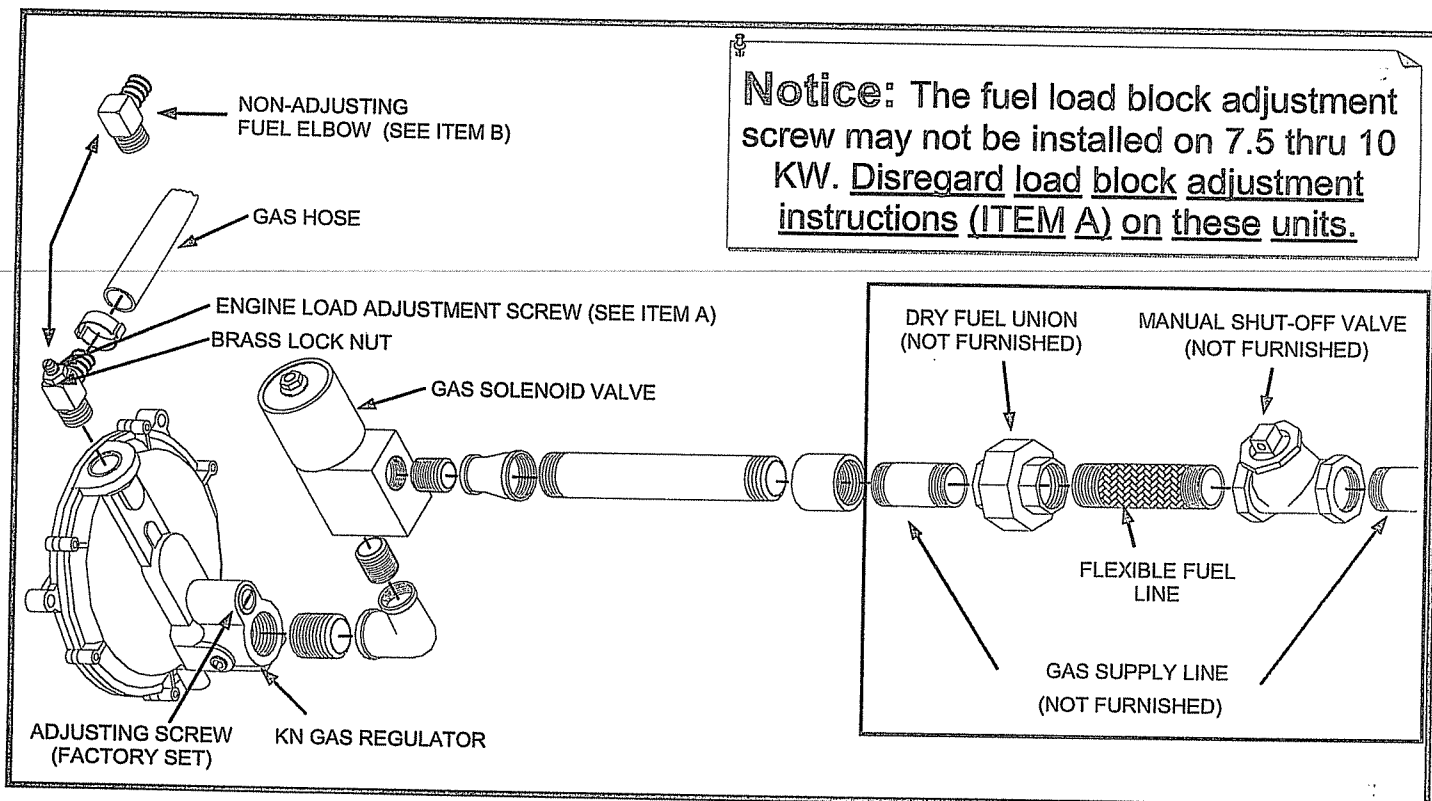
**DANGER**  
 **ALWAYS INSTALL THE GASEOUS FUEL SYSTEMS PER APPLICABLE STANDARDS AND CODES. GASEOUS FUEL LINES MUST BE PURGED PROPERLY AND LEAK TESTED BEFORE PLACING THIS GENERATOR SET INTO SERVICE. NATURAL GAS IS LIGHTER THAN AIR AND WILL RISE AND SETTLE IN HIGH AREAS. LPG (PROPANE) IS HEAVIER THAN AIR AND WILL DROP AND SETTLE IN LOW AREAS. EVEN THE SLIGHTEST AND SMALLEST SPARK CAN IGNITE THESE GASES AND CAUSE FIRE AND EXPLOSION WITH RESULTING INJURY OR DEATH TO PERSONNEL. DRY GASEOUS VAPOR FUELS HAVE MANY SPECIFIC FACTORS WHICH CAN BE DIFFERENT DEPENDING ON THE TYPE AND LOCATION OF VARIOUS APPLICATIONS.**

**DANGER**  
 **DO NOT ATTEMPT ANY WIRING INTERCONNECTIONS UNTIL ALL POWER VOLTAGE SUPPLIES TO THE TRANSFER SWITCH HAVE BEEN TURNED OFF. DO NOT INSTALL OR CONNECT BATTERY AT THIS TIME. FAILURE TO HAVE ALL VOLTAGES DISCONNECTED AND TURNED OFF AT THIS TIME WILL RESULT IN EXTREMELY HAZARDOUS AND POSSIBLY DEADLY ELECTRICAL SHOCK. ALL WIRING CONNECTIONS MUST BE DONE BY A COMPETENT, QUALIFIED ELECTRICIAN, AND ALL WORK MUST STRICTLY COMPLY WITH APPLICABLE CODES, REGULATIONS AND STANDARDS.**

**RE-CHECK FACTORY HARDWARE AND CONNECTIONS:** Remember, this standby gen-set was transported by common carrier truck to dealer destinations. This may result in a considerable distance, over rough roads, and it is entirely possible that hardware and electrical connections might become loosened. As part of the original installation tests, always include the following:

1. Check all outside housing hardware, plus inside hardware for tightness.
2. Check the termination points of all wiring in generator control panel, engine wiring, and transfer switch.
3. Usually, loose wire connections can be found by manually pulling wires, left and right, of connection point.

**TIGHTEN ALL LOOSE ITEMS FOUND.**

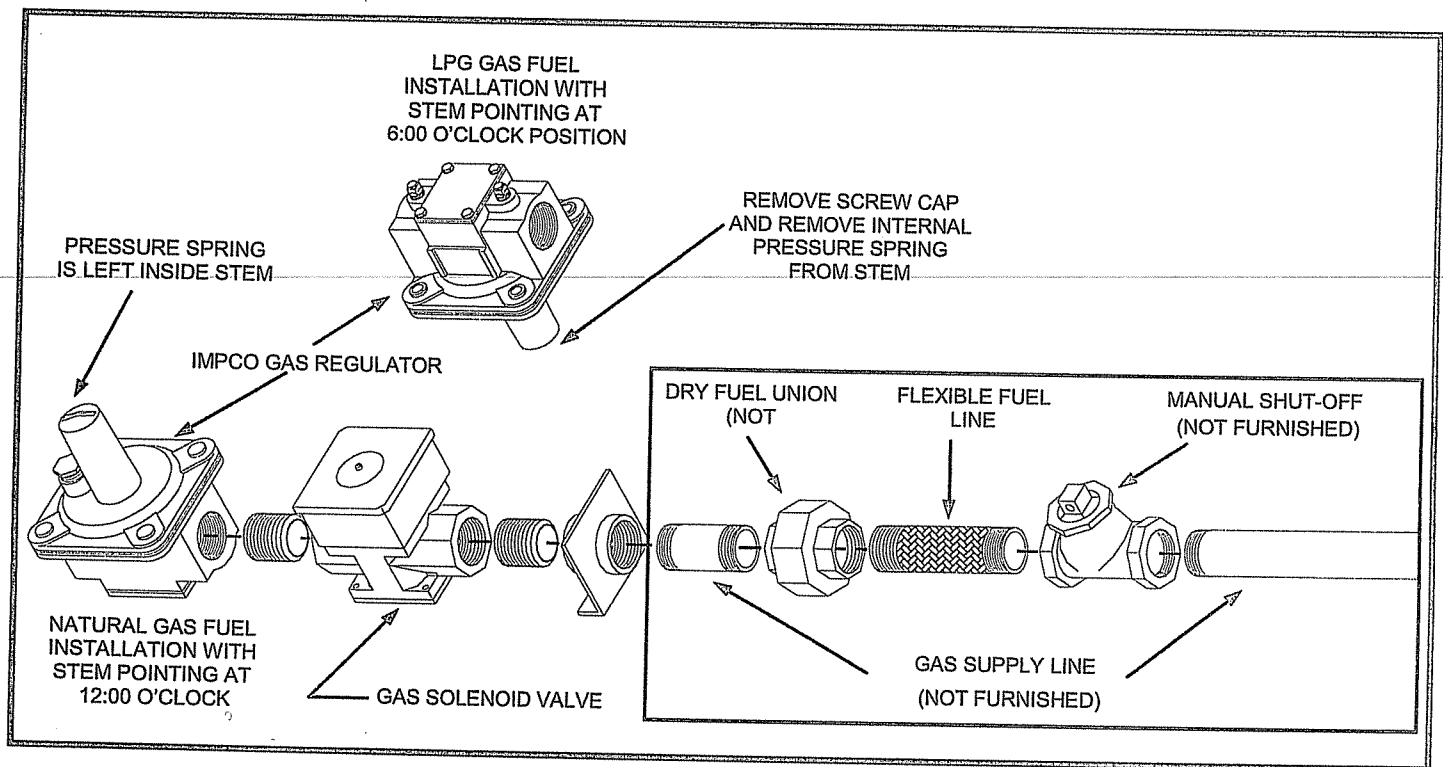


## TYPICAL DRY GAS FUEL LINE CONNECTIONS FOR 3600 GENERATORS, 7.5 THRU 15 KW.

ILLUSTRATION SHOWS TYPICAL DRY GAS FUEL LINE CONNECTIONS. THE MANUAL GAS SHUT-OFF VALVE COMPLIES WITH NFPA AND AGA REGULATIONS AND MUST BE FURNISHED BY FUEL LINE INSTALLER. THE FURNISHED AND INSTALLED SECONDARY GAS REGULATOR IS USED TO REGULATE THE GAS FLOW BY RESPONDING TO PRESSURE CHANGES IN THE INTAKE MANIFOLD OF THE ENGINE. WHEN ENGINE IS SHUT DOWN, AND THERE IS NO DEMAND FOR FUEL, THE "DEMAND" SECONDARY REGULATOR STOPS ALL GAS FLOW. THE 12 VOLT DC ELECTRIC FUEL SOLENOID VALVE IS FURNISHED AND INSTALLED IN THE FUEL LINE AS A SECOND POSITIVE SHUT-OFF DEVICE. THIS POSITIVE SHUT-OFF IS REQUIRED IN MANY LOCAL CODES THROUGHOUT THE USA.

**(A) FOR ALL KOHLER 12 KW SETS AND SOME OLDER VANGUARD MODELS 7.5-15 KW SETS.** FUEL LOAD ADJUSTMENT SCREW IS INSTALLED ON TOP OF SECONDARY REGULATOR. ALLOWING COMPLETE CARBURETION ADJUSTMENT, (FOR LPG OR NAT. GAS FUEL) LOOSEN LARGE BRASS LOCKNUT AND SCREW BRASS ADJUSTING SCREW ALL THE WAY IN. WHILE ENGINE IS CRANKING, SLOWLY UNSCREW THIS ADJUSTING SCREW UNTIL ENGINE STARTS. FINE ADJUST UNTIL ENGINE RUNS VERY SMOOTHLY, THEN TIGHTEN THE LARGE BRASS LOCK NUT.

**(B) FOR ALL VANGUARD 7.5-10 KW SETS WITH BUILT-IN ELECTRIC FUEL BYPASS SOLENOID.** A FUEL SELECTOR, TOGGLE SWITCH IS LOCATED ON CONTROL PANEL. SELECT LPG POSITION AND THE ELECTRIC FUEL BYPASS SOLENOID IS ENERGIZED, SETTING THE SYSTEM FOR OPERATION ON LPG FUEL. SELECT "NATURAL GAS" POSITION, WHICH DE-ENERGIZES ELECTRIC BYPASS SOLENOID BLOCK, SETTING THE SYSTEM FOR OPERATION ON NATURAL GAS.



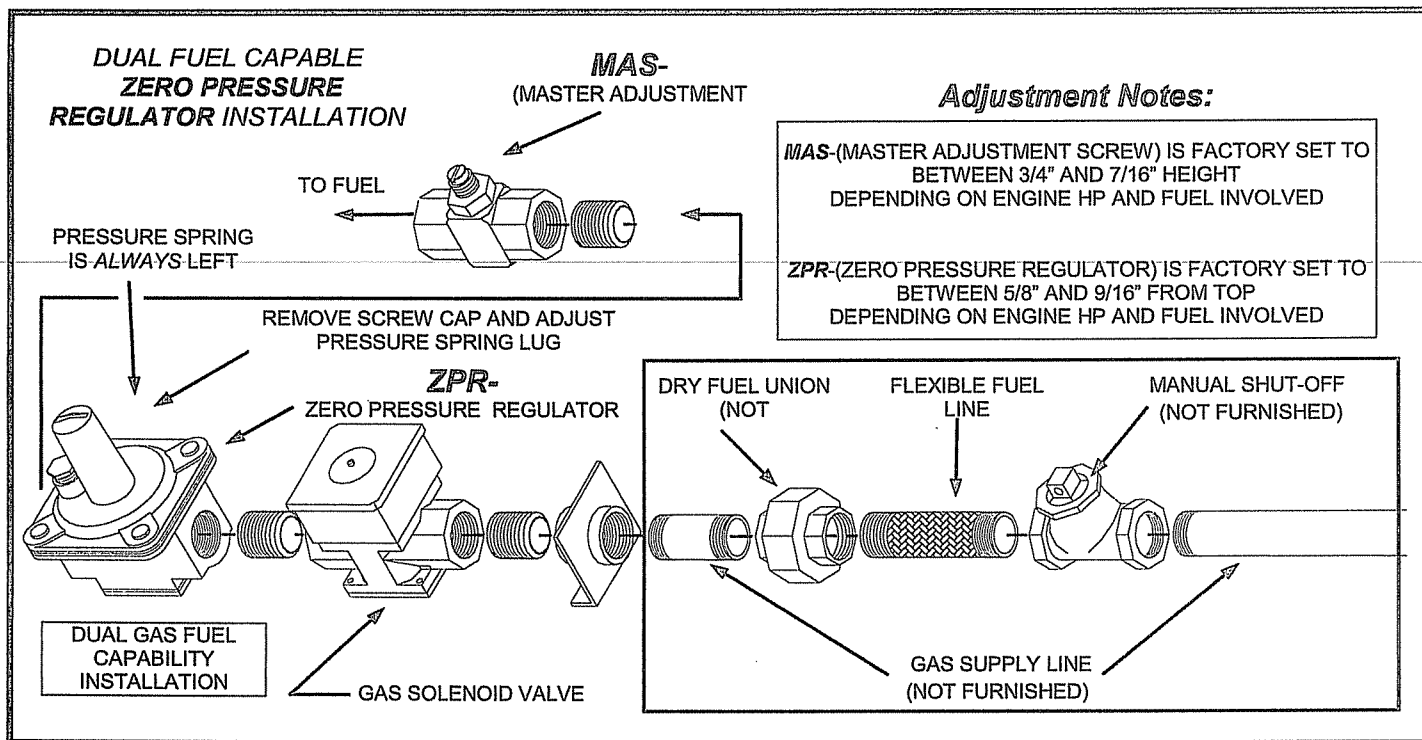
## TYPICAL DRY GAS FUEL LINE CONNECTIONS FOR GENERATORS, 85 THRU 125 KW, WITH GM "VORTEC" DRY FUEL ENGINES.

### Using "Demand" type Secondary Regulators

ILLUSTRATION SHOWS TYPICAL DRY GAS FUEL LINE CONNECTIONS. THE MANUAL GAS SHUT-OFF VALVE COMPLIES WITH NFPA AND AGA REGULATIONS AND MUST BE FURNISHED BY FUEL LINE INSTALLER. THE FURNISHED AND INSTALLED SECONDARY GAS REGULATOR IS USED TO REGULATE THE GAS FLOW BY RESPONDING TO PRESSURE CHANGES IN THE INTAKE MANIFOLD OF THE ENGINE. WHEN THE ENGINE IS SHUT DOWN, AND THERE IS NO DEMAND FOR FUEL, THE "DEMAND" SECONDARY REGULATOR STOPS ALL GAS FLOW. THE 12 VDC ELECTRIC FUEL GAS SOLENOID VALVE IS FURNISHED AND INSTALLED IN THE FUEL LINE, AS A SECOND METHOD OF POSITIVE FUEL SHUT-OFF DEVICE. THIS POSITIVE SHUT-OFF IS REQUIRED IN MANY LOCAL CODES, THROUGH-OUT THE USA.

ADJUSTMENTS: WHEN USING LPG DRY FUEL, INSTALL THE SECONDARY REGULATOR, WITH "STEM" POINTING DOWNWARD, AT 6:00 O'CLOCK POSITION. OPEN THE SCREW COVER AT END OF "STEM" AND REMOVE (AND SAVE) THE INTERNAL PRESSURE SPRING. REPLACE SCREW COVER.

WHEN USING NATURAL GAS DRY FUEL, INSTALL THE SECONDARY REGULATOR, WITH "STEM" POINTING UPWARD, AT 12:00 O'CLOCK POSITION. KEEP THE INTERNAL PRESSURE SPRING INSIDE THE "STEM".



## TYPICAL DRY GAS FUEL LINE CONNECTIONS FOR GENERATORS, 17.5 THRU 65 KW. WITH GM "VORTEC" DRY FUEL ENGINES.

### Using ZPR or Zero Pressure Regulators

ILLUSTRATION SHOWS TYPICAL DRY GAS FUEL LINE CONNECTIONS. THE MANUAL GAS SHUT-OFF VALVE COMPLIES WITH NFPA AND AGA REGULATIONS AND MUST BE FURNISHED BY FUEL LINE INSTALLER. THE FURNISHED AND INSTALLED ZERO PRESSURE SECONDARY GAS REGULATOR IS USED TO REGULATE THE GAS FLOW BY RESPONDING TO PRESSURE CHANGES IN THE INTAKE MANIFOLD OF THE ENGINE. WHEN THE ENGINE IS SHUT DOWN, AND THERE IS NO DEMAND FOR FUEL, THE ZERO PRESSURE REGULATOR STOPS ALL GAS FLOW. THE 12 VDC ELECTRIC FUEL GAS SOLENOID VALVE, IS FURNISHED AND INSTALLED IN THE FUEL LINE, AS A SECOND METHOD OF POSITIVE FUEL SHUT-OFF DEVICE. THIS POSITIVE SHUT-OFF IS REQUIRED IN MANY LOCAL CODES, THROUGH-OUT THE USA.

**ADJUSTMENTS:** WHEN USING LPG DRY FUEL, INSTALL THE ZERO PRESSURE SECONDARY REGULATOR POINTING UPWARD, AT 12:00 O'CLOCK POSITION. OPEN THE SCREW COVER AT END OF "STEM" AND ADJUST PER SPEC. REPLACE SCREW COVER.

WHEN USING NATURAL GAS DRY FUEL, REPEAT THIS PROCESS. INSTALL THE ZERO PRESSURE SECONDARY REGULATOR POINTING UPWARD, AT 12:00 O'CLOCK POSITION. OPEN THE SCREW COVER AT END OF "STEM" AND ADJUST PER SPEC. REPLACE SCREW COVER.



# DRY FUEL INFORMATION

Fuel line diameter depends on the amount of fuel needed to run an engine-generator at full load and at the distance the fuel must be moved. Refer to the product specification sheet

**Instructions:**

Use engine HP of gen-set to find fuel consumption. Then use that figure to match up with the length of fuel pipe run. Example: A 25 HP engine with natural gas fuel is to be located 100 feet from source of fuel. Locate fuel consumption in chart A for 25 HP = 260 cu. ft. (or 53 lbs./hr. depending on measurement used). Locate closest fuel consumption in chart C, to 260 cu. ft., under 100 ft. run = 195 cu. ft. locate the pipe diameter for this amount of fuel, at left side of chart C. = 1" Dia.

**TABLE A: ENGINE HORSEPOWER VERSUS FUEL CONSUMPTION.**

**Note:** Fuel consumption input may be in "lbs./hr." rating. Locate this reading and use corresponding "cu./ft." for balance of equation.

| Engine Horsepower               | 18  | 25    | 31    | 35  | 48  | 68  | 103 | 133 | 161 | 207  |
|---------------------------------|-----|-------|-------|-----|-----|-----|-----|-----|-----|------|
| LPG gas fuel ( cu. ft./hr )     | 60  | 104   | 133   | 95  | 248 | 150 | 225 | 338 | 413 | 450  |
| Natural gas fuel ( cu. ft./hr ) | 185 | 260   | 386   | 280 | 150 | 368 | 555 | 825 | 900 | 1125 |
| LPG gas fuel ( lbs./hr )        | 7   | 10.75 | 13.75 | 16  | 55  | 24  | 35  | 59  | 67  | 74   |
| Natural gas fuel ( lbs./hr )    | 42  | 53    | 78    | 47  | 24  | 70  | 100 | 145 | 158 | 164  |

**TABLE B: LPG (PROPANE) LOW PRESSURE/ 6 OZ. GAS PIPE SIZING**

Maximum pipe capacity in cubic feet of gas per hour for a gas pressure drop of 0.5 inches of water column (11) inches water column gas pressure at engine inlet)

| PIPE LENGTH         | 10     | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90  | 100 | 125 | 150 |                               |     |
|---------------------|--------|------|------|------|------|------|------|------|-----|-----|-----|-----|-------------------------------|-----|
| PIPE DIA. IN INCHES | 1/2"   | 110  | 76   | 61   | —    | —    | —    | —    | —   | —   | —   | —   | ENG. FUEL CONSUMED IN CU. FT. |     |
|                     | 3/4"   | 227  | 157  | 126  | 107  | 95   | 87   | 78   | 74  | 69  | 65  | —   |                               |     |
|                     | 1"     | 428  | 293  | 236  | 201  | 179  | 164  | 151  | 138 | 129 | 123 | 110 |                               | 101 |
|                     | 1-1/4" | 807  | 523  | 445  | 379  | 338  | 309  | 285  | 255 | 242 | 232 | 208 |                               | 191 |
|                     | 1-1/2" | 1523 | 987  | 840  | 715  | 638  | 583  | 538  | 481 | 457 | 438 | 393 |                               | 360 |
|                     | 1-3/4" | 2874 | 1862 | 1585 | 1349 | 1204 | 1100 | 1015 | 908 | 862 | 826 | 742 |                               | 679 |

**TABLE C NATURAL GAS PIPE SIZING**

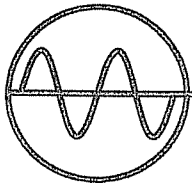
Maximum pipe capacity in cubic feet of gas per hour for 0.5 psi or less, and a pressure drop of 0.5 inches of water column (based on a 0.60 specific gravity gas)

| PIPE LENGTH         | 10     | 20   | 30   | 40   | 50   | 60   | 70   | 80   | 90   | 100  | 125  | 150  |                               |      |
|---------------------|--------|------|------|------|------|------|------|------|------|------|------|------|-------------------------------|------|
| PIPE DIA. IN INCHES | 1/2"   | 175  | 120  | 97   | 82   | 73   | 66   | 61   | —    | —    | —    | —    | ENG. FUEL CONSUMED IN CU. FT. |      |
|                     | 3/4"   | 300  | 250  | 200  | 170  | 151  | 138  | 125  | 118  | 110  | 103  | 93   |                               | 84   |
|                     | 1"     | 680  | 465  | 375  | 320  | 285  | 260  | 240  | 220  | 205  | 195  | 175  |                               | 160  |
|                     | 1-1/4" | 1400 | 950  | 770  | 660  | 580  | 530  | 490  | 460  | 430  | 400  | 360  |                               | 325  |
|                     | 1-1/2" | 2100 | 1460 | 1180 | 990  | 900  | 810  | 750  | 690  | 650  | 620  | 550  |                               | 500  |
|                     | 1-3/4" | 3230 | 2246 | 1815 | 1523 | 1385 | 1246 | 1154 | 1062 | 1000 | 954  | 846  |                               | 769  |
|                     | 2"     | 4969 | 3455 | 2792 | 2343 | 2132 | 1917 | 1775 | 1634 | 1539 | 1468 | 1302 |                               | 1183 |

# AUTOMATIC START, DRY FUEL TROUBLE SHOOTING CHART

| SYMPTOM                                                                   | POSSIBLE CAUSES                                                                                                                                                                                                                                                                                                                                                                                                                                              | REPAIR SOLUTION                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Engine cranks but will not start                                          | <ol style="list-style-type: none"> <li>1. Fuel is shut off.</li> <li>2. Electric fuel solenoid is off.</li> <li>3. Low engine oil</li> <li>4. Engine ignition at fault</li> <li>5. Low charged battery</li> <li>6. Disconnected control wires from engine control panel to transfer switch.</li> </ol>                                                                                                                                                       | <ol style="list-style-type: none"> <li>1. Check fuel line ON-OFF valve</li> <li>2. Test for 12 VDC supply to valve</li> <li>3. Replace engine oil</li> <li>4. Repair engine ignition</li> <li>5. Recharge battery to 100%</li> <li>6. Check wiring from TS1 on gen-set to terminal strip on transfer switch</li> </ol>                                                                                                                                                    |
| Engine cranks and runs but is erratic, rough running or frequently stops. | <ol style="list-style-type: none"> <li>1. Wrong fuel</li> <li>2. Wrong fuel pressure</li> <li>3. Wrong secondary regulator</li> <li>4. Diameter to small in fuel line</li> <li>5. Other appliances on fuel line</li> <li>6. Secondary regulator out of adjustment</li> <li>7. Secondary regulator is damaged</li> <li>8. Wrong or no regulator on LPG tank</li> <li>9. Near empty LPG tank</li> <li>10. Fuel line too long, and diameter to small</li> </ol> | <ol style="list-style-type: none"> <li>1. Fuel must be "vapor withdrawal"</li> <li>2. Pressure must be 6 ounces</li> <li>3. Regulator must be 6 ounces.</li> <li>4. Check fuel line chart, Page 6</li> <li>5. Fuel line must be direct to gen-set.</li> <li>6. See "ADJUSTMENTS" Page</li> <li>7. Replace KN regulator.</li> <li>8. Install 6 ounce regulator.</li> <li>9. Check tank and refill.</li> <li>10. Reinstall fuel source or move generator closer.</li> </ol> |
| Engine will not stop cranking                                             | <ol style="list-style-type: none"> <li>1. Contacts stuck on Engine Starter solenoid.</li> <li>2. Bad control wires</li> </ol>                                                                                                                                                                                                                                                                                                                                | <ol style="list-style-type: none"> <li>1. Replace engine starter solenoid.</li> <li>2. Check wiring from TS1 to transfer switch on starting device.</li> </ol>                                                                                                                                                                                                                                                                                                            |
| No transfer to generator power when utility power fails                   | <ol style="list-style-type: none"> <li>1. Defective transfer motor.</li> <li>2. Bad control wires</li> <li>3. Bad transfer relay.</li> <li>4. Bad engine controller</li> </ol>                                                                                                                                                                                                                                                                               | <ol style="list-style-type: none"> <li>1. Replace transfer motor/coil assm.</li> <li>2. Check #1 and #4 terminal wires.</li> <li>3. Replace transfer relay</li> <li>4. Replace engine controller</li> </ol>                                                                                                                                                                                                                                                               |
| No or low generator voltage output                                        | <ol style="list-style-type: none"> <li>1. Generator circuit breaker open.</li> <li>2. Engine running too slow.</li> <li>3. Defective connected load.</li> <li>4. Bad rotor or stator</li> </ol>                                                                                                                                                                                                                                                              | <ol style="list-style-type: none"> <li>1. Reset generator circuit breaker.</li> <li>2. Set engine speed at 3800 RPM.</li> <li>3. remove all load and re-test.</li> <li>4. Test and replace if necessary.</li> </ol>                                                                                                                                                                                                                                                       |
| Engine runs rough, especially in cold weather                             | <ol style="list-style-type: none"> <li>1. Fuel lines are condensing</li> <li>2. Faulty spark plugs</li> </ol>                                                                                                                                                                                                                                                                                                                                                | <ol style="list-style-type: none"> <li>1. Remove and blow out fuel lines</li> <li>2. Replace plugs with proper gaps</li> </ol>                                                                                                                                                                                                                                                                                                                                            |

◆ It is important to know, when replacing spark plugs, the plug gap must be set for dry fuel: Vanguard 8 HP = .020 in. plug gap; Kohler 25 HP = .020 in. plug gap; all G.M. Vortec engines = .035 in. plug gap.



# SENTRY-PRO POWER SYSTEMS

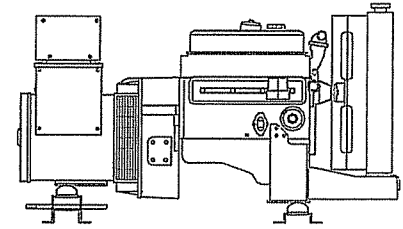
By Gillette Generators, Inc.

MODEL  
**SP-180**

## LIQUID COOLED LPG/NG ENGINE GENERATOR SET

### KW POWER RATINGS RANGE

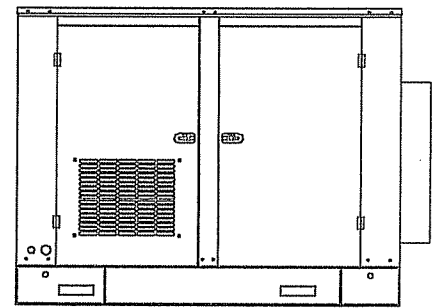
| Model  | HZ | MAXIMUM<br>150°C RISE |      | STANDBY<br>125°C RISE |       | PRIME<br>105°C RISE |       |
|--------|----|-----------------------|------|-----------------------|-------|---------------------|-------|
|        |    | LPG                   | N.G. | LPG                   | N.G.  | LPG                 | N.G.  |
| SP-180 | 60 | 18                    | 18   | 16-18                 | 16-18 | 15-17               | 15-17 |
|        | 50 | 16                    | 16   | 14                    | 14    | 13                  | 13    |



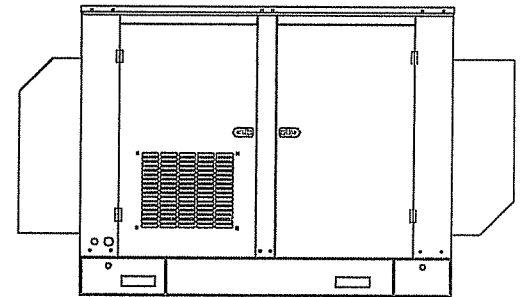
"OPEN" GEN-SET

### STANDARD FEATURES

- All generator sets are USA prototype built and thoroughly tested. Production models are USA factory built and 100% load tested.
- All generator sets will accept 100% rated load in one step, per NFPA-110.
- All generators are UL-1446 certified.
- Solid state, frequency compensated voltage regulation is standard on all gen-sets.
- Electronic engine governor incorporates a throttle body actuator, which allows precise isochronous frequency regulation.
- A brushless rotating field generator design with shunt wound excitation system and connectable at a broad range of voltages.
- SENTINEL III provides programmable microprocessor logic and digital display for different engine and generator functions, plus automatic fault shutdowns.
- The heavy duty, rugged gas engine is capable of delivering rated power at 1800 RPM (60 HZ) or 1500 RPM (50 HZ).
- All generator set control systems components and accessories provide a 1-year limited warranty at time of initial start-up. Generators and engines are governed by separate warranties.
- "OPEN" Generator Sets: There is no enclosure, so gen-set must be placed within a weather protected area, un-inhabited by humans or animals, with proper ventilation. Muffler and flexible exhaust hose are supplied loose for final exhaust installation by others.
- "STANDARD" Housing: Full weather protection and average sound attenuation for normal applications.
- "SUPER-SILENT" Housing: Full weather protection and superior sound attenuation for specific low noise applications. (See "Sound Level" chart).



"STANDARD" HOUSED GEN-SET



"SUPER-SILENT" HOUSED GEN-SET

### GENERATOR RATINGS

| GENERATOR MODEL | VOLTAGE |     | PH | HZ | LIQUID PROPANE GAS FUEL   |     |                           |     |                         |     | NATURAL GAS FUEL          |     |                           |     |                         |     |
|-----------------|---------|-----|----|----|---------------------------|-----|---------------------------|-----|-------------------------|-----|---------------------------|-----|---------------------------|-----|-------------------------|-----|
|                 |         |     |    |    | 150°C RISE MAXIMUM RATING |     | 125°C RISE STANDBY RATING |     | 105°C RISE PRIME RATING |     | 150°C RISE MAXIMUM RATING |     | 125°C RISE STANDBY RATING |     | 105°C RISE PRIME RATING |     |
|                 | L-N     | L-L |    |    | KW/KVA                    | AMP | KW/KVA                    | AMP | KW/KVA                  | AMP | KW/KVA                    | AMP | KW/KVA                    | AMP | KW/KVA                  | AMP |
| SP-180-1-1      | 120     | 240 | 1  | 60 | 18/18                     | 75  | 18/18                     | 75  | 17/17                   | 71  | 18/18                     | 75  | 18/18                     | 75  | 17/17                   | 71  |
| SP-180-3-2      | 120     | 208 | 3  | 60 | 18/22.5                   | 63  | 16/20                     | 56  | 15/18.8                 | 52  | 18/22.5                   | 63  | 16/20                     | 56  | 15/18.8                 | 52  |
| SP-180-3-3      | 120     | 240 | 3  | 60 | 18/22.5                   | 54  | 17/21                     | 51  | 16/20                   | 48  | 18/22.5                   | 54  | 16/20                     | 48  | 16/20                   | 48  |
| SP-180-3-4      | 277     | 480 | 3  | 60 | 18/22.5                   | 27  | 17/21                     | 26  | 16/20                   | 24  | 18/22.5                   | 27  | 16/20                     | 24  | 16/20                   | 24  |
| SP-180-3-5      | 127     | 220 | 3  | 60 | 18/22.5                   | 59  | 17/21                     | 56  | 16/20                   | 53  | 18/22.5                   | 59  | 16/20                     | 53  | 16/20                   | 53  |
| SP-180-1-1-5    | 110     | 220 | 1  | 50 | 16/16                     | 73  | 14/14                     | 64  | 13/13                   | 59  | 16/16                     | 73  | 14/14                     | 64  | 13/13                   | 59  |
| SP-180-3-2-5    | 110     | 220 | 3  | 50 | 16/20                     | 53  | 14/17.5                   | 46  | 13/16                   | 43  | 16/20                     | 53  | 14/17.5                   | 46  | 13/16                   | 43  |
| SP-180-3-3-5    | 219     | 380 | 3  | 50 | 16/20                     | 31  | 14/17.5                   | 27  | 13/16                   | 25  | 16/20                     | 31  | 14/17.5                   | 27  | 13/16                   | 25  |
| SP-180-3-4-5    | 240     | 415 | 3  | 50 | 16/20                     | 28  | 14/17.5                   | 24  | 13/16                   | 23  | 16/20                     | 28  | 14/17.5                   | 24  | 13/16                   | 23  |
| SP-180-3-5-5    | 231     | 400 | 3  | 50 | 16/20                     | 29  | 14/17.5                   | 25  | 13/16                   | 24  | 16/20                     | 29  | 14/17.5                   | 25  | 13/16                   | 24  |

RATINGS: All single phase gen-sets are rated at unity (1.0) power factor. All three phase gen-sets are rated at .8 power factor. "MAXIMUM RATINGS" are for short period running, not exceeding 1 hour. "STANDBY RATINGS" are strictly for gen-sets that are used for back-up emergency power to a failed normal utility power source. This standby rating allows varying loads, with no overload capability, for the entire duration of utility power outage. "PRIME RATINGS" are strictly for gen-sets that provide the prime source of electric power, where normal utility power is unavailable or unreliable. A 10% overload is allowed for a total of 1 hour, within every 12 hours of operation. All gen-set power ratings are based on temperature rise measured by resistance method as defined by MIL-STD 705C and IEEE STD 115, METHOD 6.4.4. All generators have class H (180°C) insulation system on both rotor and stator windings. All factory tests and KW/KVA charts shown above are based on 150°C (maximum), 125°C (standby), and 100°C (prime) R/R winding temperature, within a maximum 35°C ambient condition. Generators operated at maximum power ratings will not exceed the temperature rise limitation for class H insulation system, as specified in NEMA MG1-22.40. Specifications & ratings are subject to change without prior notice.

# APPLICATION AND ENGINEERING DATA FOR MODEL SP-180

## GENERATOR SPECIFICATIONS

Type ..... 4 Pole, revolving field design  
 Exciter ..... Brushless, shunt excited  
 Voltage Regulator ..... Solid State, HZ/Volts  
 Voltage Regulation ..... ½%, No load to full load  
 Frequency ..... Field convertible, 60 HZ to 50 HZ  
 Frequency Regulation ..... ½% (½ cycle, no load to full load)  
 Unbalanced Load Capability ..... 100% of nameplate rating  
 Motor Starting ..... 35% Dip on specific voltages  
 Total Stator and Load Insulation ..... Class H, 180°C  
 Temperature Rise ..... 150°C R/R, maximum rating @ 35°C amb.  
 ..... 125°C R/R, standby rating @ 35°C amb.  
 ..... 100°C R/R, prime rating @ 35°C amb.  
 Bearing ..... 1, Pre-lubed and sealed  
 Power Leads ..... 12 Leads re-connectable for three phase  
 ..... And 4 Leads for dedicated single phase  
 Coupling ..... Direct flexible disc.  
 Total Harmonic Distortion ..... Max 3½% (MIL-STD705B)  
 Telephone Interference Factor ..... Max 50 (NEMA MG1-22)  
 Deviation Factor ..... Max 5% (MIL-STD 405B)  
 Alternator ..... Self ventilating and drip-proof  
 Ltd. Standby Warranty ..... 24 Months or 1000 hrs., first to occur  
 Ltd. Prime Warranty ..... 12 Months or 1000 hrs., first to occur

## GENERATOR FEATURES

- Full alternator protection with SENTINEL III controller, having UL-508 certification.
- Automatic voltage regulator with over-excitation, under-frequency compensation, under-speed protection, and EMI filtering. Entire solid-state board is encapsulated for moisture protection.
- Alternator power ratings are based on temperature rise, measured by resistance method, as defined in MIL-STD 705C and IEEE STD 115, Method 6.4.4.
- Power ratings will not exceed temperature rise limitation for class H insulation as per NEMA MG1-22.40.
- Insulation resistance to ground, exceeds 1.5 meg-ohm.
- Stator receives 2000 V. hi-potential test on main windings, and rotor windings receive a 1500 V. hi-potential test, as per MIL-STD 705B.
- Full amortisseur windings with UL-1446 listing on all alternators.
- Complete engine-alternator torsional acceptance, confirmed during initial prototype testing.
- Full load testing on all engine-alternator sets, before shipping.

## ENGINE SPECIFICATIONS AND APPLICATIONS DATA

### ENGINE

Manufacturer ..... General Motors  
 Model and Type ..... Vortec, 3.0L, 4 cycle  
 Aspiration ..... Naturally  
 Cylinder Arrangement ..... 4 Cylinders, In-Line  
 Displacement Cu. In. (Liters) ..... 181 (3.0)  
 Bore & Stroke In. (Cm.) ..... 4 (10.2) & 3.6 (9.1)  
 Compression Ratio ..... 9.3:1  
 Main Bearings & Style ..... 4, Babbitt  
 Cylinder Head ..... Cast Iron  
 Pistons ..... 4, Silicon Aluminum  
 Crankshaft ..... Nodular Iron  
 Exhaust Valve ..... Forged Steel  
 Governor ..... Electronic  
 Frequency Reg. (no load-full load) ..... Isochronous  
 Frequency Reg. (steady state) ..... ½%  
 Air Cleaner ..... Dry, Replaceable Cartridge  
 Oil Filter ..... 1, Replaceable Spin-On  
 Ltd. Warranty ..... 12 Months or 2000 hrs., first to occur  
**Speed ..... 60 HZ ..... 50 HZ**  
 Rated RPM ..... 1800 ..... 1500  
 Piston Speed, ft/min (m/min) ..... 992 (302) ..... 827 (252)  
 Max Power, bhp (kw) Standby /LPG\* ..... 45 (33) ..... 35 (26)  
 Max Power, bhp (kw) Prime /LPG\* ..... 41 (31) ..... 33 (25)  
 BMEP: psi (kpa) Standby ..... 105 (724) ..... 84 (578)  
 BMEP: psi (kpa) Prime ..... 102 (703) ..... 82 (563)

\*Derate LPG bhp(kw) ratings by 5% for Natural Gas Ratings.

### FUEL SYSTEM

Type ..... LPG or NAT. GAS, Vapor Withdrawal  
 Fuel Pressure (kpa), in. H<sub>2</sub>O ..... (1.74-2.74), 7"-15"  
 Secondary Fuel Regulator ..... LPG or NG Vapor System  
 Auto Fuel Lock-Off Solenoid ..... Standard on all sets

### FUEL CONSUMPTION

|                                                          |           | LP GAS: FT <sup>3</sup> /HR (M <sup>3</sup> /HR) | 60 HZ     | 50 HZ    |
|----------------------------------------------------------|-----------|--------------------------------------------------|-----------|----------|
| STDBY                                                    | 100% LOAD |                                                  | 119 (3.2) | 88 (2.7) |
|                                                          | 75% LOAD  |                                                  | 79 (2.3)  | 64 (1.9) |
|                                                          | 50% LOAD  |                                                  | 70 (2)    | 58 (1.5) |
| PRIME                                                    | 100% LOAD |                                                  | 104 (2.9) | 88 (2.6) |
|                                                          | 75% LOAD  |                                                  | 75 (2.2)  | 64 (1.8) |
|                                                          | 50% LOAD  |                                                  | 67 (1.8)  | 57 (1.5) |
| <b>LPG = 2500 BTU X FT<sup>3</sup>/HR = Total BTU/HR</b> |           |                                                  |           |          |

|                                                         |           | NAT. GAS: FT <sup>3</sup> /HR (M <sup>3</sup> /HR) | 60 HZ     | 50 HZ     |
|---------------------------------------------------------|-----------|----------------------------------------------------|-----------|-----------|
| STDBY                                                   | 100% LOAD |                                                    | 275 (7.8) | 221 (6.3) |
|                                                         | 75% LOAD  |                                                    | 199 (5.7) | 159 (4.5) |
|                                                         | 50% LOAD  |                                                    | 176 (5.0) | 140 (4)   |
| PRIME                                                   | 100% LOAD |                                                    | 248 (7.0) | 198 (3.4) |
|                                                         | 75% LOAD  |                                                    | 179 (5.1) | 143 (4.2) |
|                                                         | 50% LOAD  |                                                    | 159 (5.2) | 127 (3.6) |
| <b>NG = 1000 BTU X FT<sup>3</sup>/HR = Total BTU/HR</b> |           |                                                    |           |           |

### OIL SYSTEM

Type ..... Full Pressure  
 Oil Pan Capacity qt. (L) ..... 3.7 (3.5)  
 Oil Pan Capacity W/ filter qt. (L) ..... 5.2 (4.7)

### ELECTRICAL SYSTEM

Ignition System ..... Electronic  
 Eng. Alternator:  
     Ground ..... Negative  
     Volts DC ..... 12  
     Max. Amp Output ..... 70  
 Recommended Battery: ..... 12 VDC, 55 Amp/Hr, Size BCI# 27f,  
     ..... 12½"lg X 6¾"wi X 9"hi, with round posts & neg. ground  
     ..... Cold-Cranking amps at 0°F (-17.8°C) : 660 CCA  
 Eng. Starter Motor ..... 12 VDC

## COOLING SYSTEM

|                                                                                                             |                                 |
|-------------------------------------------------------------------------------------------------------------|---------------------------------|
| Type of System .....                                                                                        | Pressurized, closed recovery    |
| Coolant Pump .....                                                                                          | Pre-lubricated, self-sealing    |
| Cooling Fan Type (no. of blades) .....                                                                      | Pusher (10)                     |
| Fan Diameter inches (cm) .....                                                                              | 18" (46)                        |
| Ambient Capacity of Radiator °F (°C).....                                                                   | 125 (51.6)                      |
| Engine Jacket Coolant Capacity Gal (L).....                                                                 | 1.0 (3.8)                       |
| Radiator Coolant Capacity Gal. (L) .....                                                                    | 2.3 (8.7)                       |
| Maximum Restriction of Cooling Air Intake<br>and discharge side of radiator in. H <sub>2</sub> O (kpa)..... | .5 (.125)                       |
| <b>Speed</b> .....                                                                                          | <b>60 HZ</b> ..... <b>50 HZ</b> |
| Water Pump Capacity gpm (L/min).....                                                                        | 18.2 (69)..... 15.5 (59)        |
| Heat Rejection Coolant : Btum (kw).....                                                                     | 1445 (25)..... 1228 (21)        |

Note: Coolant temp. shut-down switch setting at 212°F (100°C) with 50/50 (water/antifreeze) mix.

## AIR REQUIREMENTS

|                                                  |                                 |
|--------------------------------------------------|---------------------------------|
| <b>Speed</b> .....                               | <b>60 HZ</b> ..... <b>50 HZ</b> |
| Radiator Air Flow cfm (m <sup>3</sup> /min)..... | 4800 (137)..... 4000 (117)      |
| Combustion Air cfm (m <sup>3</sup> /min) .....   | 94 (2.7)..... 75 (2.2)          |
| Heat Rejected to Ambient:                        |                                 |
| Engine: kw (btu/min).....                        | 12.5 (713)..... 10.6 (606)      |
| Alternator: kw (btu/min).....                    | 4.0 (245)..... 3.4 (208)        |

## EXHAUST SYSTEM

|                                                     |                                 |
|-----------------------------------------------------|---------------------------------|
| Emissions; HC : g/hp-hr.....                        | 44-69*                          |
| Emissions; CO : g/hp-hr.....                        | 1035-3450*                      |
| Emissions; NoX : g/hp-hr .....                      | 65-179*                         |
| Muffler Inlet – Outlet Size .....                   | 2"                              |
| Max. Back Pressure hg .....                         | 2"                              |
| <b>Speed</b> .....                                  | <b>60 HZ</b> ..... <b>50 HZ</b> |
| Exhaust Flow, stby kw: cfm (m <sup>3</sup> /min) .. | 289 (8.18)..... 231 (6.5)       |
| Exhaust Temp., stby kw: °F (°C) .....               | 1200 (648)..... 1100 (593)      |

\*Engine manufacturer's estimated range.

## SOUND LEVELS

|                                            | Open<br>Set | Std.<br>Encl. | Super-<br>Silent<br>Encl. |
|--------------------------------------------|-------------|---------------|---------------------------|
| dB(A), Industrial Muffler, no load.....    | 76.....     | 70.....       | 67                        |
| dB(A), Industrial Muffler, full load ..... | 78.....     | 72.....       | 69                        |
| dB(A), Residential Muffler, no load .....  | 74.....     | 68.....       | 64                        |
| dB(A), Residential Muffler, full load..... | 76.....     | 70.....       | 66                        |
| dB(A), Critical Muffler, no load .....     | 71.....     | 65.....       | 62                        |
| dB(A), Critical Muffler, full load.....    | 73.....     | 67.....       | 64                        |

Note: Open sets (no enclosure) have loose flexible exhaust hose and loose industrial muffler, ready for installation by others. Standard enclosure has installed industrial muffler. Super-Silent enclosure has installed residential muffler. All gen-sets are available with optional residential or critical grade mufflers. Reduce all sound levels by 5% for 50 HZ, 1500 RPM operation. Sound tests are taken at 21 ft. (3 m) from source of noise.

## DERATE GENERATOR FOR ALTITUDE

3% per 1000 ft. above 3000 ft. from sea level  
3% per 305 meters above 914 meters from sea level

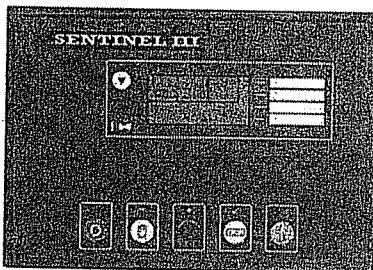
## DERATE GENERATOR FOR TEMPERATURE

2% per 10°F above 85°F  
2% per 12°C above 30°C

## DIMENSIONS AND WEIGHTS

|                            | Open<br>Set   | Standard<br>Enclosure | Super-<br>Silent<br>Enclosure |
|----------------------------|---------------|-----------------------|-------------------------------|
| Length in (cm).....        | 50 (127)..... | 74 (188).....         | 92 (234)                      |
| Width in (cm).....         | 32 (81).....  | 36 (92).....          | 36 (92)                       |
| Height in (cm).....        | 34 (86).....  | 53 (134).....         | 53 (134)                      |
| Net Weight lbs (kg).....   | 875 (397).... | 1275 (578).....       | 1460 (662)                    |
| Ship Weight lbs (kg) ..... | 975 (442).... | 1375 (624).....       | 1560 (708)                    |

# SENTINEL III & IV® DIGITAL MICROPROCESSOR CONTROLLERS



### SENTINEL III®\*

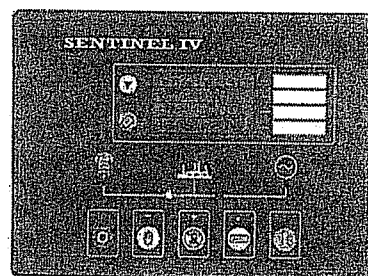
A field programmable microprocessor controller as standard equipment on all 4-pole gen-sets. This solid-state module automatically starts and stops the engine, indicates operational status and

fault conditions, by means of a graphical LCD display and flashing LED. This controller provides: Generator Volts (L1-N, L2-N, L3-N) and (L1-L2, L2-L3, L3-L1) • Generator Amps (L1, L2, L3) • Generator Frequency (HZ) • Engine Speed (RPM) • Engine Oil Pressure (PSI or BAR) • Engine Temperature (C and F) • Starting Battery Volts • Engine Run Time (Hours) • Scroll Button • Push Buttons for Manual On – Manual Off – Manual Operation – Auto Operation – Programming. These displays are supplemented further by LCD icon displays for various engine alarms. \*New for the fall of 2003.

Multiple alarm channels are provided to monitor the following: Under and Over Speed • Charge Alternator Failure • Emergency Stop • Low Oil Pressure • High Engine Temperature • Fail to Start • Fail to Come to Rest • Loss of Speed Sensing Signal. All alarms are indicated by an LCD icon and LED light.

### CONTROLLER FEATURES

- Microprocessor Based Design
- Programmable Operations
- Auto Engine Starting and Stopping
- Custom Graphical Icon Display
- Provides Engine and Generator Instrumentation
- Provides Engine Alarms and Status Information
- Configurable Inputs, Outputs, Alarms, and Timers
- LED and LCD alarm Indications
- Compatible with SENTINEL IV for easy upgrade



### SENTINEL IV®

This is an upgrade to SENTINEL III, having the same features, plus the following: Monitors utility power supply • Remote communication via optional RS232 port (RS485 porting available

– consult factory) • This module can also signal cell phones using GSM SMS message system, to report faults • Use this controller in conjunction with remote annunciators (see optional part # S-19)

# STANDARD AND OPTIONAL FEATURES FOR MODEL SP-180

## STANDARD FEATURES

### CONTROL PANEL:

- SENTINEL III<sup>®</sup> programmable microprocessor with logic and digital LCD display features:
  - AC volts, amps, frequency, oil pressure, engine temperature, DC volts, engine run hours, and additional display symbols for a wide variety of protective shutdowns.
  - Automatic shutdowns include: under and over speed, under and over volts, high engine temperature, low oil pressure, and engine over-crank.

### GENERATOR:

- AC generator ◦ shunt excited ◦ brushless design ◦ single bearing ◦ direct connection to engine with flex disc ◦ class H, 180°C insulation ◦ self ventilated ◦ drip proof construction

### VOLTAGE REGULATOR:

- ½% Voltage regulation ◦ EMI filter ◦ under-speed protection ◦ over-excitation protection ◦ total encapsulation

### ELECTRICAL:

- Battery tray ◦ battery cables ◦ battery hold down straps

### SUPPORT:

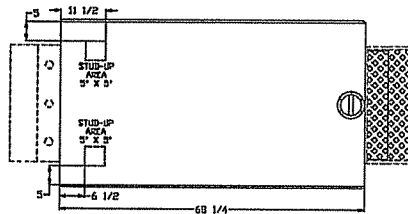
- Operation, maintenance, and installation literature.
- Call 1-800-777-9639 or Fax 1-574-262-1840
- E-mail : [engineering@gillettegenerators.com](mailto:engineering@gillettegenerators.com)
- Web : [www.gillettegenerators.com](http://www.gillettegenerators.com)

### ENGINE:

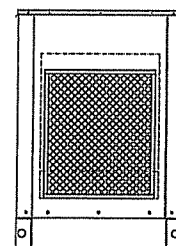
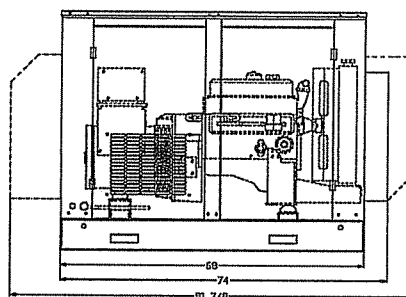
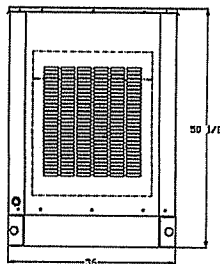
- Full flow oil filter ◦ air filter ◦ oil pump ◦ solenoid type starter motor ◦ hi-temp radiator ◦ jacket water pump
- thermostat ◦ pusher fan and guard ◦ exhaust manifold
- silencer ◦ 12 VDC battery charging alternator ◦ flexible exhaust connector ◦ "Isochronous" duty, electronic governor ◦ secondary dry fuel regulator ◦ dry fuel lock-off solenoid ◦ vibration isolators ◦ closed coolant recovery system with 50/50 water to anti-freeze mixture

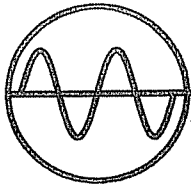
## ACCESSORY ITEMS

- |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li><input type="checkbox"/> Engine Coolant Heater with automatic 60°F on, 80°F off, thermostat</li> <li><input type="checkbox"/> Starting Battery Heater Blanket with automatic 60°F on, 80°F off, thermostat</li> <li><input type="checkbox"/> Starting Battery (size BCI# 27f, 660 CCA, 12 VDC)</li> <li><input type="checkbox"/> Battery Charger, float type, 12 VDC at max. charge, with ammeter.</li> <li><input type="checkbox"/> Battery Charger, float type, 12 VDC at max. charge, with ammeter and voltmeter, meeting NFPA-110 requirements.</li> <li><input type="checkbox"/> Radiator for dirty environment</li> <li><input type="checkbox"/> Flexible Oil Drain hose with on-off valve</li> <li><input type="checkbox"/> Flexible Radiator Drain hose with on-off valve</li> <li><input type="checkbox"/> External Permanent Magnet Generator (PMG) for increased induction motor starting capacity.</li> <li><input type="checkbox"/> Exhaust Silencer (Residential Grade) installed inside or outside (<u>underline one</u>) weather housing. Note: This muffler style (mounted outside housing) is standard equipment on Super-Silent housings.</li> </ul> | <ul style="list-style-type: none"> <li><input type="checkbox"/> Exhaust Silencer (Critical Grade) installed inside or outside (<u>underline one</u>) weather housing.</li> <li><input type="checkbox"/> Circuit Breaker. (Choice of mounted or loose)</li> <li><input type="checkbox"/> Circuit Breaker with NEMA-3R Enclosure. Note: These breakers are shipped loose for installation in remote outside area by others.</li> <li><input type="checkbox"/> Single or Three Phase Windings, 50 or 60 Hertz.</li> <li><input type="checkbox"/> SENTINEL IV Controller with all features of Sentinel III, plus allowing full telemetry remote control annunciation, and utility power monitoring.</li> <li><input type="checkbox"/> Remote annunciator for up to (10) reporting functions. An additional relay expansion module, plus a second annunciator adds another (10) reporting functions. Note: SENTINEL IV must be selected, to achieve remote annunciation.</li> <li><input type="checkbox"/> All aluminum weather and sound deadening housing for coastal areas. (allow 8-10 weeks for special order)</li> </ul> |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



Exhaust system mounted on roof, not shown. Design & specifications subject to change without prior notice. Dimensions shown are approximate. Contact Gillette for certified drawings. DO NOT USE DIMENSIONS FOR INSTALLATION PURPOSES.





# SENTRY-PRO POWER SYSTEMS

By Gillette Generators, Inc.

MODEL  
**SP-220**

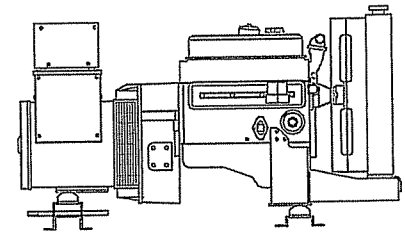
## LIQUID COOLED LPG/NG ENGINE GENERATOR SET

### KW POWER RATINGS RANGE

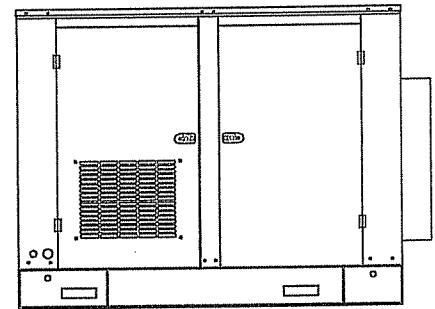
| Model  | HZ | MAXIMUM<br>150°C RISE |      | STANDBY<br>125°C RISE |       | PRIME<br>105°C RISE |       |
|--------|----|-----------------------|------|-----------------------|-------|---------------------|-------|
|        |    | LPG                   | N.G. | LPG                   | N.G.  | LPG                 | N.G.  |
| SP-220 | 60 | 22                    | 22   | 19-22                 | 19-22 | 18-20               | 18-20 |
|        | 50 | 18                    | 18   | 18                    | 18    | 16                  | 16    |

### STANDARD FEATURES

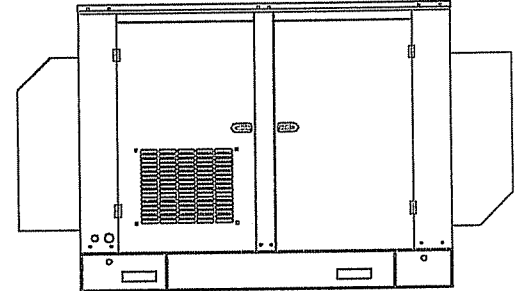
- All generator sets are USA prototype built and thoroughly tested. Production models are USA factory built and 100% load tested.
- All generator sets will accept 100% rated load in one step, per NFPA-110.
- All generators are UL-1446 certified.
- Solid state, frequency compensated voltage regulation is standard on all gen-sets.
- Electronic engine governor incorporates a throttle body actuator, which allows precise isochronous frequency regulation.
- A brushless rotating field generator design with shunt wound excitation system and connectable at a broad range of voltages.
- SENTINEL III provides programmable microprocessor logic and digital display for different engine and generator functions, plus automatic fault shutdowns.
- The heavy duty, rugged gas engine is capable of delivering rated power at 1800 RPM (60 HZ) or 1500 RPM (50 HZ).
- All generator set control systems components and accessories provide a 1-year limited warranty at time of initial start-up. Generators and engines are governed by separate warranties.
- "OPEN" Generator Sets: There is no enclosure, so gen-set must be placed within a weather protected area, un-inhabited by humans or animals, with proper ventilation. Muffler and flexible exhaust hose are supplied loose for final exhaust installation by others.
- "STANDARD" Housing: Full weather protection and average sound attenuation for normal applications.
- "SUPER-SILENT" Housing: Full weather protection and superior sound attenuation for specific low noise applications. (See "Sound Level" chart).



"OPEN" GEN-SET



"STANDARD" HOUSED GEN-SET



"SUPER-SILENT" HOUSED GEN-SET

### GENERATOR RATINGS

| GENERATOR MODEL | VOLTAGE |     | PH | HZ | LIQUID PROPANE GAS FUEL   |     |                           |     |                         |     | NATURAL GAS FUEL          |     |                           |     |                         |     |
|-----------------|---------|-----|----|----|---------------------------|-----|---------------------------|-----|-------------------------|-----|---------------------------|-----|---------------------------|-----|-------------------------|-----|
|                 | L-N     | L-L |    |    | 150°C RISE MAXIMUM RATING |     | 125°C RISE STANDBY RATING |     | 105°C RISE PRIME RATING |     | 150°C RISE MAXIMUM RATING |     | 125°C RISE STANDBY RATING |     | 105°C RISE PRIME RATING |     |
|                 |         |     |    |    | KW/KVA                    | AMP | KW/KVA                    | AMP | KW/KVA                  | AMP | KW/KVA                    | AMP | KW/KVA                    | AMP | KW/KVA                  | AMP |
| SP-220-1-1      | 120     | 240 | 1  | 60 | 22/22                     | 92  | 19/19                     | 79  | 18/18                   | 75  | 22/22                     | 92  | 19/19                     | 79  | 18/18                   | 75  |
| SP-220-3-2      | 120     | 208 | 3  | 60 | 22/27.5                   | 76  | 22/27.5                   | 76  | 20/25                   | 70  | 22/27.5                   | 76  | 22/27.5                   | 76  | 20/25                   | 70  |
| SP-220-3-3      | 120     | 240 | 3  | 60 | 22/27.5                   | 66  | 22/27.5                   | 66  | 20/25                   | 60  | 22/27.5                   | 66  | 22/27.5                   | 66  | 20/25                   | 60  |
| SP-220-3-4      | 277     | 480 | 3  | 60 | 22/27.5                   | 33  | 22/27.5                   | 33  | 20/25                   | 30  | 22/27.5                   | 33  | 22/27.5                   | 33  | 20/25                   | 30  |
| SP-220-3-5      | 127     | 220 | 3  | 60 | 22/27.5                   | 72  | 22/27.5                   | 72  | 20/25                   | 66  | 22/27.5                   | 72  | 22/27.5                   | 72  | 20/25                   | 66  |
| SP-220-1-1-5    | 110     | 220 | 1  | 50 | 18/18                     | 82  | 18/18                     | 82  | 16/16                   | 73  | 18/18                     | 82  | 18/18                     | 82  | 16/16                   | 73  |
| SP-220-3-2-5    | 110     | 220 | 3  | 50 | 18/22.5                   | 59  | 18/22.5                   | 59  | 16/20                   | 53  | 18/22.5                   | 59  | 18/22.5                   | 59  | 16/20                   | 53  |
| SP-220-3-3-5    | 219     | 380 | 3  | 50 | 18/22.5                   | 34  | 18/22.5                   | 34  | 16/20                   | 31  | 18/22.5                   | 34  | 18/22.5                   | 34  | 16/20                   | 31  |
| SP-220-3-4-5    | 240     | 415 | 3  | 50 | 18/22.5                   | 31  | 18/22.5                   | 31  | 16/20                   | 28  | 18/22.5                   | 31  | 18/22.5                   | 31  | 16/20                   | 28  |
| SP-220-3-5-5    | 231     | 400 | 3  | 50 | 18/22.5                   | 33  | 18/22.5                   | 33  | 16/20                   | 29  | 18/22.5                   | 33  | 18/22.5                   | 33  | 16/20                   | 29  |

RATINGS: All single phase gen-sets are rated at unity (1.0) power factor. All three phase gen-sets are rated at .8 power factor. "MAXIMUM RATINGS" are for short period running, not exceeding 1 hour. "STANDBY RATINGS" are strictly for gen-sets that are used for back-up emergency power to a failed normal utility power source. This standby rating allows varying loads, with no overload capability, for the entire duration of utility power outage. "PRIME RATINGS" are strictly for gen-sets that provide the prime source of electric power, where normal utility power is unavailable or unreliable. A 10% overload is allowed for a total of 1 hour, within every 12 hours of operation. All gen-set power ratings are based on temperature rise measured by resistance method as defined by MIL-STD 705C and IEEE STD 115, METHOD 6.4.4. All generators have class H (180°C) insulation system on both rotor and stator windings. All factory tests and KW/KVA charts shown above are based on 150°C (maximum), 125°C (standby), and 100°C (prime) R/R winding temperature, within a maximum 35°C ambient condition. Generators operated at maximum power ratings will not exceed the temperature rise limitation for class H insulation system, as specified in NEMA MG1-22.40. Specifications & ratings are subject to change without prior notice.

# APPLICATION AND ENGINEERING DATA FOR MODEL SP-220

## GENERATOR SPECIFICATIONS

Type ..... 4 Pole, revolving field design  
 Exciter ..... Brushless, shunt excited  
 Voltage Regulator ..... Solid State, HZ/Volts  
 Voltage Regulation ..... ½%, No load to full load  
 Frequency ..... Field convertible, 60 HZ to 50 HZ  
 Frequency Regulation ..... ½% (½ cycle, no load to full load)  
 Unbalanced Load Capability ..... 100% of nameplate rating  
 Motor Starting ..... 35% Dip on specific voltages  
 Total Stator and Load Insulation ..... Class H, 180°C  
 Temperature Rise ..... 150°C R/R, maximum rating @ 35°C amb.  
 ..... 125°C R/R, standby rating @ 35°C amb.  
 ..... 100°C R/R, prime rating @ 35°C amb.  
 Bearing ..... 1, Pre-lubed and sealed  
 Power Leads ..... 12 Leads re-connectable for three phase  
 ..... And 4 Leads for dedicated single phase  
 Coupling ..... Direct flexible disc.  
 Total Harmonic Distortion ..... Max 3½% (MIL-STD705B)  
 Telephone Interference Factor ..... Max 50 (NEMA MG1-22)  
 Deviation Factor ..... Max 5% (MIL-STD 405B)  
 Alternator ..... Self ventilating and drip-proof  
 Ltd. Standby Warranty ..... 24 Months or 1000 hrs., first to occur  
 Ltd. Prime Warranty ..... 12 Months or 1000 hrs., first to occur

## GENERATOR FEATURES

- Full alternator protection with SENTINEL III controller, having UL-508 certification.
- Automatic voltage regulator with over-excitation, under-frequency compensation, under-speed protection, and EMI filtering. Entire solid-state board is encapsulated for moisture protection.
- Alternator power ratings are based on temperature rise, measured by resistance method, as defined in MIL-STD 705C and IEEE STD 115, Method 6.4.4.
- Power ratings will not exceed temperature rise limitation for class H insulation as per NEMA MG1-22.40.
- Insulation resistance to ground, exceeds 1.5 meg-ohm.
- Stator receives 2000 V. hi-potential test on main windings, and rotor windings receive a 1500 V. hi-potential test, as per MIL-STD 705B.
- Full amortisseur windings with UL-1446 listing on all alternators.
- Complete engine-alternator torsional acceptance, confirmed during initial prototype testing.
- Full load testing on all engine-alternator sets, before shipping.

## ENGINE SPECIFICATIONS AND APPLICATIONS DATA

### ENGINE

Manufacturer ..... General Motors  
 Model and Type ..... Vortec, 3.0L, 4 cycle  
 Aspiration ..... Naturally  
 Cylinder Arrangement ..... 4 Cylinders, In-Line  
 Displacement Cu. In. (Liters) ..... 181 (3.0)  
 Bore & Stroke In. (Cm.) ..... 4 (10.2) & 3.6 (9.1)  
 Compression Ratio ..... 9.3:1  
 Main Bearings & Style ..... 4, Babbitt  
 Cylinder Head ..... Cast Iron  
 Pistons ..... 4, Silicon Aluminum  
 Crankshaft ..... Nodular Iron  
 Exhaust Valve ..... Forged Steel  
 Governor ..... Electronic  
 Frequency Reg. (no load-full load) ..... Isochronous  
 Frequency Reg. (steady state) ..... ± ½%  
 Air Cleaner ..... Dry, Replaceable Cartridge  
 Oil Filter ..... 1, Replaceable Spin-On  
 Ltd. Warranty ..... 12 Months or 2000 hrs., first to occur  
**Speed** ..... **60 HZ** ..... **50 HZ**  
 Rated RPM ..... 1800 ..... 1500  
 Piston Speed, ft/min (m./min) ..... 992 (302) ..... 827 (252)  
 Max Power, bhp (kw) Standby /LPG\* ..... 45 (33) ..... 35 (26)  
 Max Power, bhp (kw) Prime /LPG\* ..... 41 (31) ..... 33 (25)  
 BMEP: psi (kpa) Standby ..... 105 (724) ..... 84 (578)  
 BMEP: psi (kpa) Prime ..... 102 (703) ..... 82 (563)  
 \*Derate LPG bhp (kw) ratings by 5% for natural gas ratings.

### FUEL CONSUMPTION

|                                                       |           | LP GAS: FT <sup>3</sup> /HR (M <sup>3</sup> /HR) | 60 HZ     | 50 HZ    |
|-------------------------------------------------------|-----------|--------------------------------------------------|-----------|----------|
| STDBY                                                 | 100% LOAD |                                                  | 122 (3.5) | 98 (3)   |
|                                                       | 75% LOAD  |                                                  | 88 (2.5)  | 71 (2.1) |
|                                                       | 50% LOAD  |                                                  | 78 (2.2)  | 63 (1.7) |
| PRIME                                                 | 100% LOAD |                                                  | 115 (3.2) | 98 (2.9) |
|                                                       | 75% LOAD  |                                                  | 83 (2.4)  | 71 (2)   |
|                                                       | 50% LOAD  |                                                  | 74 (2.0)  | 63 (1.7) |
| <b>LPG = 2500 BTU X FT<sup>3</sup> = Total BTU/HR</b> |           |                                                  |           |          |

|                                                      |           | NAT. GAS: FT <sup>3</sup> /HR (M <sup>3</sup> /HR) | 60 HZ     | 50 HZ     |
|------------------------------------------------------|-----------|----------------------------------------------------|-----------|-----------|
| STDBY                                                | 100% LOAD |                                                    | 306 (8.7) | 245 (7)   |
|                                                      | 75% LOAD  |                                                    | 221 (6.3) | 177 (5)   |
|                                                      | 50% LOAD  |                                                    | 196 (5.5) | 156 (4.4) |
| PRIME                                                | 100% LOAD |                                                    | 275 (7.8) | 220 (3.8) |
|                                                      | 75% LOAD  |                                                    | 199 (5.7) | 159 (4.7) |
|                                                      | 50% LOAD  |                                                    | 176 (5.2) | 141 (4)   |
| <b>NG = 1000 BTU X FT<sup>3</sup> = Total BTU/HR</b> |           |                                                    |           |           |

### OIL SYSTEM

Type ..... Full Pressure  
 Oil Pan Capacity qt. (L) ..... 3.7 (3.5)  
 Oil Pan Cap. W/ filter qt. (L) ..... 5.2 (4.7)

### ELECTRICAL SYSTEM

Ignition System ..... Electronic  
 Eng. Alternator:  
 Ground ..... Negative  
 Volts DC ..... 12  
 Max. Amp Output ..... 70  
 Recommended Battery: ..... 12 VDC, 55 Amp/Hr, Size BCI# 27f,  
 ..... 12½"lg X 6¾"wi X 9"hi, with round posts & neg. ground  
 ..... Cold-Cranking amps at 0°F (-17.8°C) : 660 CCA  
 Eng. Starter Motor ..... 12 VDC

### FUEL SYSTEM

Type ..... LPG or NAT. GAS, Vapor Withdrawal  
 Fuel Pressure (kpa), in. H<sub>2</sub>O ..... (1.74-2.74), 7"-15"  
 Secondary Fuel Regulator ..... LPG or NG Vapor System  
 Auto Fuel Lock-Off Solenoid ..... Standard on all sets



## COOLING SYSTEM

|                                                                                                             |                                 |
|-------------------------------------------------------------------------------------------------------------|---------------------------------|
| Type of System .....                                                                                        | Pressurized, closed recovery    |
| Coolant Pump .....                                                                                          | Pre-lubricated, self-sealing    |
| Cooling Fan Type (no. of blades) .....                                                                      | Pusher (10)                     |
| Fan Diameter inches (cm).....                                                                               | 18" (46)                        |
| Ambient Capacity of Radiator °F (°C).....                                                                   | 125 (51.6)                      |
| Engine Jacket Coolant Capacity Gal (L).....                                                                 | 1.0 (3.8)                       |
| Radiator Coolant Capacity Gal. (L).....                                                                     | 2.3 (8.7)                       |
| Maximum Restriction of Cooling Air Intake<br>and discharge side of radiator in. H <sub>2</sub> O (kpa)..... | .5 (.125)                       |
| <b>Speed .....</b>                                                                                          | <b>60 HZ .....</b> <b>50 HZ</b> |
| Water Pump Capacity gpm (L/min).....                                                                        | 18.2 (69).....15.5 (59)         |
| Heat Rejection Coolant : Btun (kw).....                                                                     | 1445 (25).....1228 (21)         |
| Note: Coolant temp. shut-down switch setting at 212°F (100°C) with 50/50<br>(water/antifreeze) mix.         |                                 |

## AIR REQUIREMENTS

|                                                  |                                 |
|--------------------------------------------------|---------------------------------|
| <b>Speed .....</b>                               | <b>60 HZ .....</b> <b>50 HZ</b> |
| Radiator Air Flow cfm (m <sup>3</sup> /min)..... | 4800 (137).....4000 (117)       |
| Combustion Air cfm (m <sup>3</sup> /min).....    | 94 (2.7).....75 (2.2)           |
| Heat Rejected to Ambient:                        |                                 |
| Engine: kw (btu/min).....                        | 12.5 (713).....10.6 (606)       |
| Alternator: kw (btu/min).....                    | 4.0 (245).....3.4 (208)         |

## EXHAUST SYSTEM

|                                                     |                                 |
|-----------------------------------------------------|---------------------------------|
| Emissions; HC : g/hp-hr.....                        | 47-74*                          |
| Emissions; CO : g/hp-hr.....                        | 1104-3680*                      |
| Emissions; NoX : g/hp-hr .....                      | 70-191*                         |
| Muffler Inlet – Outlet Size .....                   | 2"                              |
| Max. Back Pressure hg .....                         | 2"                              |
| <b>Speed .....</b>                                  | <b>60 HZ .....</b> <b>50 HZ</b> |
| Exhaust Flow, stby kw: cfm (m <sup>3</sup> /min) .. | 289 (8.18).....231 (6.5)        |
| Exhaust Temp., stby kw: °F (°C) .....               | 1200 (648).....1100 (593)       |
| *Engine manufacturer's estimated range.             |                                 |

## SOUND LEVELS

|                                            | Open<br>Set | Std.<br>Encl. | Super-<br>Silent<br>Encl. |
|--------------------------------------------|-------------|---------------|---------------------------|
| dB(A), Industrial Muffler, no load .....   | 77.....     | 71 .....      | 68                        |
| dB(A), Industrial Muffler, full load ..... | 79.....     | 73 .....      | 70                        |
| dB(A), Residential Muffler, no load .....  | 75.....     | 69 .....      | 65                        |
| dB(A), Residential Muffler, full load..... | 77.....     | 71 .....      | 67                        |
| dB(A), Critical Muffler, no load .....     | 72.....     | 66 .....      | 63                        |
| dB(A), Critical Muffler, full load.....    | 74.....     | 68 .....      | 65                        |

Note: Open sets (no enclosure) has loose flexible exhaust hose and loose industrial muffler, ready for installation by others. Standard enclosure has installed industrial muffler. Super-Silent enclosure has installed residential muffler. All gen-sets are available with optional residential or critical grade mufflers. Reduce all sound levels by 5% for 50 HZ, 1500 RPM operation. Sound tests are taken at 21 ft. (3 m) from source of noise.

## DERATE GENERATOR FOR ALTITUDE

3% per 1000 ft. above 3000 ft. from sea level  
3% per 305 meters above 914 meters from sea level

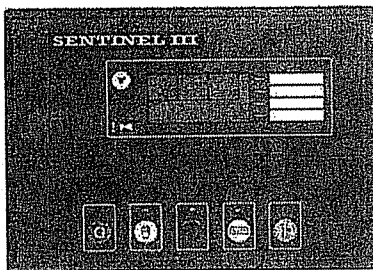
## DERATE GENERATOR FOR TEMPERATURE

2% per 10°F above 85°F  
2% per 12°C above 30°C

## DIMENSIONS AND WEIGHTS

|                            | Open<br>Set   | Standard<br>Enclosure | Super-<br>Silent<br>Enclosure |
|----------------------------|---------------|-----------------------|-------------------------------|
| Length in (cm).....        | 50 (127)..... | 74 (188) .....        | 92 (234)                      |
| Width in (cm).....         | 32 (81).....  | 36 (92) .....         | 36 (92)                       |
| Height in (cm).....        | 34 (86).....  | 53 (134) .....        | 53 (134)                      |
| Net Weight lbs (kg).....   | 910 (413).... | 1310 (594) .....      | 1495 (678)                    |
| Ship Weight lbs (kg) ..... | 1010 (458)... | 1410 (640) .....      | 1595 (725)                    |

# SENTINEL III & IV® DIGITAL MICROPROCESSOR CONTROLLERS



### SENTINEL III®

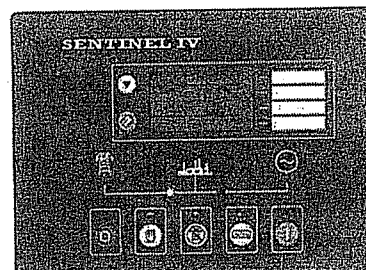
A field programmable microprocessor controller as standard equipment on all 4-pole gen-sets. This solid-state module automatically starts and stops the engine, indicates operational status and

fault conditions, by means of a graphical LCD display and flashing LED. This controller provides: Generator Volts (L1-N, L2-N, L3-N) and (L1-L2, L2-L3, L3-L1) • Generator Amps (L1, L2, L3) • Generator Frequency (HZ) • Engine Speed (RPM) • Engine Oil Pressure (PSI or BAR) • Engine Temperature (C and F) • Starting Battery Volts • Engine Run Time (Hours) • Scroll Button • Push Buttons for Manual On – Manual Off – Manual Operation – Auto Operation – Programming. These displays are supplemented further by LCD icon displays for various engine alarms. \*New for the fall of 2003.

Multiple alarm channels are provided to monitor the following: Under and Over Speed • Charge Alternator Failure • Emergency Stop • Low Oil Pressure • High Engine Temperature • Fail to Start • Fail to Come to Rest • Loss of Speed Sensing Signal. All alarms are indicated by an LCD icon and LED light.

### CONTROLLER FEATURES

- Microprocessor Based Design
- Programmable Operations
- Auto Engine Starting and Stopping
- Custom Graphical Icon Display
- Provides Engine and Generator Instrumentation
- Provides Engine Alarms and Status Information
- Configurable Inputs, Outputs, Alarms, and Timers
- LED and LCD alarm Indications
- Compatible with SENTINEL IV for easy upgrade



### SENTINEL IV®

This is an upgrade to SENTINEL III, having the same features, plus the following: Monitors utility power supply • Remote communication via optional RS232 port (RS485 porting available

– consult factory) • This module can also signal cell phones using GSM SMS message system, to report faults • Use this controller in conjunction with remote annunciators (see optional part # S-19)

# STANDARD AND OPTIONAL FEATURES FOR MODEL SP-220

## STANDARD FEATURES

### CONTROL PANEL:

- SENTINEL III<sup>®</sup> programmable microprocessor with logic and digital LCD display features:
  - AC volts, amps, frequency, oil pressure, engine temperature, DC volts, engine run hours, and additional display symbols for a wide variety of protective shutdowns.
  - Automatic shutdowns include: under and over speed, under and over volts, high engine temperature, low oil pressure, and engine over-crank.

### ENGINE:

Full flow oil filter ◦ air filter ◦ oil pump ◦ solenoid type starter motor ◦ hi-temp radiator ◦ jacket water pump ◦ thermostat ◦ pusher fan and guard ◦ exhaust manifold ◦ silencer ◦ 12 VDC battery charging alternator ◦ flexible exhaust connector ◦ "Isochronous" duty, electronic governor ◦ secondary dry fuel regulator ◦ dry fuel lock-off solenoid ◦ vibration isolators ◦ closed coolant recovery system with 50/50 water to anti-freeze mixture

### GENERATOR:

AC generator ◦ shunt excited ◦ brushless design ◦ single bearing ◦ direct connection to engine with flex disc ◦ class H, 180°C insulation ◦ self ventilated ◦ drip proof construction

### VOLTAGE REGULATOR:

½% Voltage regulation ◦ EMI filter ◦ under-speed protection ◦ over-excitation protection ◦ total encapsulation

### ELECTRICAL:

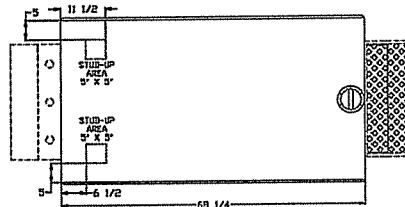
Battery tray ◦ battery cables ◦ battery hold down straps

### SUPPORT:

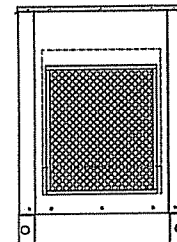
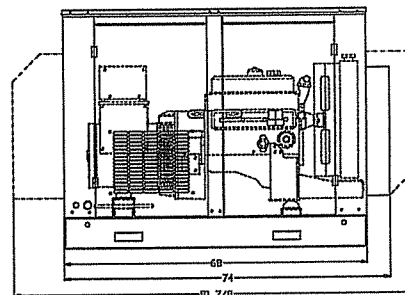
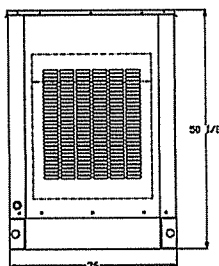
Operation, maintenance, and installation literature.  
Call 1-800-777-9639 or Fax 1-574-262-1840  
E-mail : [engineering@gillettegenerators.com](mailto:engineering@gillettegenerators.com)  
Web : [www.gillettegenerators.com](http://www.gillettegenerators.com)

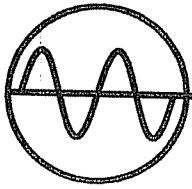
## ACCESSORY ITEMS

- Engine Coolant Heater with automatic 60°F on, 80°F off, thermostat
- Starting Battery Heater Blanket with automatic 60°F on, 80°F off, thermostat
- Starting Battery (size BCI# 27f, 660 CCA, 12 VDC)
- Battery Charger, float type, 12 VDC at max. charge, with ammeter.
- Battery Charger, float type, 12 VDC at max. charge, with ammeter and voltmeter, meeting NFPA-110 requirements.
- Radiator for dirty environment
- Flexible Oil Drain hose with on-off valve
- Flexible Radiator Drain hose with on-off valve
- External Permanent Magnet Generator (PMG) for increased induction motor starting capacity.
- Exhaust Silencer (Residential Grade) installed inside or outside (underline one) weather housing. Note: This muffler style (mounted outside housing) is standard equipment on Super-Silent housings.
- Exhaust Silencer (Critical Grade) installed inside or outside (underline one) weather housing.
- Circuit Breaker. (Choice of mounted or loose)
- Circuit Breaker with NEMA-3R Enclosure. Note: These breakers are shipped loose for installation in remote outside area by others.
- Single or Three Phase Windings, 50 or 60 Hertz.
- SENTINEL IV Controller with all features of Sentinel III, plus allowing full telemetry remote control annunciation, and utility power monitoring.
- Remote annunciator for up to (10) reporting functions. An additional relay expansion module, plus a second annunciator adds another (10) reporting functions. Note: SENTINEL IV must be selected, to achieve remote annunciation.
- All aluminum weather and sound deadening housing for coastal areas. (allow 8-10 weeks for special order)



Exhaust system mounted on roof, not shown. Design & specifications subject to change without prior notice. Dimensions shown are approximate. Contact Gillette for certified drawings. DO NOT USE DIMENSIONS FOR INSTALLATION PURPOSES.





# SENTRY-PRO POWER SYSTEMS

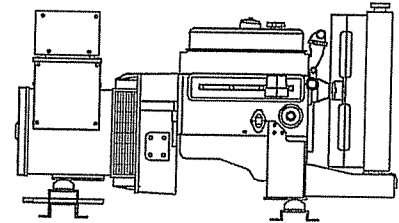
By Gillette Generators, Inc.

MODEL  
**SP-300**

**LIQUID COOLED LPG/NG ENGINE GENERATOR SET**

## KW POWER RATINGS RANGE

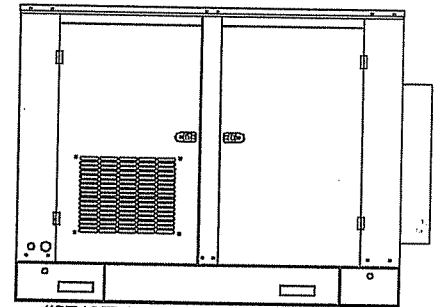
| Model | HZ | MAXIMUM 150°C RISE |      | STANDBY 125°C RISE |      | PRIME 105°C RISE |       |
|-------|----|--------------------|------|--------------------|------|------------------|-------|
|       |    | LPG                | N.G. | LPG                | N.G. | LPG              | N.G.  |
|       |    | <b>SP-300</b>      | 60   | 30                 | 27   | 27               | 25    |
|       | 50 | 24                 | 21   | 21-22              | 20   | 20-18            | 17-18 |



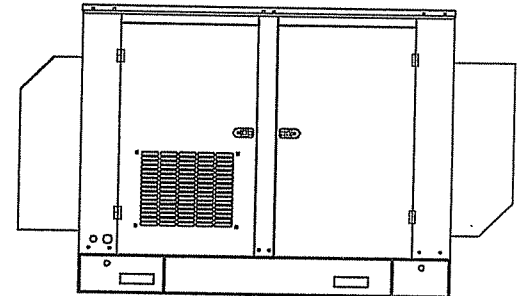
"OPEN" GEN-SET

## STANDARD FEATURES

- All generator sets are USA prototype built and thoroughly tested. Production models are USA factory built and 100% load tested.
- All generator sets will accept 100% rated load in one step, per NFPA-110.
- All generators are UL-1446 certified.
- Solid state, frequency compensated voltage regulation is standard on all gen-sets.
- Electronic engine governor incorporates a throttle body actuator, which allows precise isochronous frequency regulation.
- A brushless rotating field generator design with shunt wound excitation system and connectable at a broad range of voltages.
- SENTINEL III provides programmable microprocessor logic and digital display for different engine and generator functions, plus automatic fault shutdowns.
- The heavy duty, rugged gas engine is capable of delivering rated power at 1800 RPM (60 HZ) or 1500 RPM (50 HZ).
- All generator set control systems components and accessories provide a 1-year limited warranty at time of initial start-up. Generators and engines are governed by separate warranties.
- "OPEN" Generator Sets: There is no enclosure, so gen-set must be placed within a weather protected area, un-inhabited by humans or animals, with proper ventilation. Muffler and flexible exhaust hose are supplied loose for final exhaust installation by others.
- "STANDARD" Housing: Full weather protection and average sound attenuation for normal applications.
- "SUPER-SILENT" Housing: Full weather protection and superior sound attenuation for specific low noise applications. (See "Sound Level" chart).



"STANDARD" HOUSED GEN-SET



"SUPER-SILENT" HOUSED GEN-SET

## GENERATOR RATINGS

| GENERATOR MODEL | VOLTAGE |     | PH | HZ | LIQUID PROPANE GAS FUEL   |     |                           |     |                         |     | NATURAL GAS FUEL          |     |                           |     |                         |     |
|-----------------|---------|-----|----|----|---------------------------|-----|---------------------------|-----|-------------------------|-----|---------------------------|-----|---------------------------|-----|-------------------------|-----|
|                 | L-N     | L-L |    |    | 150°C RISE MAXIMUM RATING |     | 125°C RISE STANDBY RATING |     | 105°C RISE PRIME RATING |     | 150°C RISE MAXIMUM RATING |     | 125°C RISE STANDBY RATING |     | 105°C RISE PRIME RATING |     |
|                 |         |     |    |    | KW/KVA                    | AMP | KW/KVA                    | AMP | KW/KVA                  | AMP | KW/KVA                    | AMP | KW/KVA                    | AMP | KW/KVA                  | AMP |
| SP-300-1-1      | 120     | 240 | 1  | 60 | 30/30                     | 125 | 27/27                     | 113 | 24/24                   | 100 | 27/27                     | 113 | 25/25                     | 104 | 22/22                   | 92  |
| SP-300-3-2      | 120     | 208 | 3  | 60 | 30/37.5                   | 104 | 27/33.8                   | 94  | 24/30                   | 83  | 27/33.8                   | 94  | 25/31                     | 87  | 22/27.5                 | 77  |
| SP-300-3-3      | 120     | 240 | 3  | 60 | 30/37.5                   | 90  | 27/33.8                   | 81  | 24/30                   | 72  | 27/33.8                   | 81  | 25/31                     | 75  | 22/27.5                 | 66  |
| SP-300-3-4      | 277     | 480 | 3  | 60 | 30/37.5                   | 45  | 27/33.8                   | 41  | 24/30                   | 36  | 27/33.8                   | 41  | 25/31                     | 38  | 22/27.5                 | 33  |
| SP-300-3-5      | 127     | 220 | 3  | 60 | 30/37.5                   | 96  | 27/33.8                   | 89  | 24/30                   | 79  | 27/33.8                   | 89  | 25/31                     | 82  | 22/27.5                 | 72  |
| SP-300-1-1-5    | 110     | 220 | 1  | 50 | 24/24                     | 109 | 22/22                     | 100 | 20/20                   | 91  | 21/21                     | 96  | 20/20                     | 91  | 18/18                   | 82  |
| SP-300-3-2-5    | 110     | 220 | 3  | 50 | 24/30                     | 79  | 21/26                     | 69  | 18/22.5                 | 59  | 21/26                     | 69  | 20/25                     | 66  | 17/21                   | 56  |
| SP-300-3-3-5    | 219     | 380 | 3  | 50 | 24/30                     | 46  | 21/26                     | 40  | 18/22.5                 | 34  | 21/26                     | 40  | 20/25                     | 38  | 17/21                   | 32  |
| SP-300-3-4-5    | 240     | 415 | 3  | 50 | 24/30                     | 42  | 21/26                     | 37  | 18/22.5                 | 31  | 21/26                     | 37  | 20/25                     | 35  | 17/21                   | 30  |
| SP-300-3-5-5    | 231     | 400 | 3  | 50 | 24/30                     | 43  | 21/26                     | 38  | 18/22.5                 | 33  | 21/26                     | 38  | 20/25                     | 36  | 17/21                   | 31  |

RATINGS: All single phase gen-sets are rated at unity (1.0) power factor. All three phase gen-sets are rated at .8 power factor. "MAXIMUM RATINGS" are for short period running, not exceeding 1 hour. "STANDBY RATINGS" are strictly for gen-sets that are used for back-up emergency power to a failed normal utility power source. This standby rating allows varying loads, with no overload capability, for the entire duration of utility power outage. "PRIME RATINGS" are strictly for gen-sets that provide the prime source of electric power, where normal utility power is unavailable or unreliable. A 10% overload is allowed for a total of 1 hour, within every 12 hours of operation. All gen-set power ratings are based on temperature rise measured by resistance method as defined by MIL-STD 705C and IEEE STD 115, METHOD 6.4.4. All generators have class H (180°C) insulation system on both rotor and stator windings. All factory tests and KW/KVA charts shown above are based on 150°C (maximum), 125°C (standby), and 100°C (prime) R/R winding temperature, within a maximum 35°C ambient condition. Generators operated at maximum power ratings will not exceed the temperature rise limitation for class H insulation system, as specified in NEMA MG1-22.40. Specifications & ratings are subject to change without prior notice.

# APPLICATION AND ENGINEERING DATA FOR MODEL SP-300

## GENERATOR SPECIFICATIONS

Type ..... 4 Pole, revolving field design  
 Exciter ..... Brushless, shunt excited  
 Voltage Regulator ..... Solid State, HZ/Volts  
 Voltage Regulation ..... ½%, No load to full load  
 Frequency ..... Field convertible, 60 HZ to 50 HZ  
 Frequency Regulation ..... ½% (½ cycle, no load to full load)  
 Unbalanced Load Capability ..... 100% of nameplate rating  
 Motor Starting ..... 35% Dip on specific voltages  
 Total Stator and Load Insulation ..... Class H, 180°C  
 Temperature Rise ..... 150°C R/R, maximum rating @ 35°C amb.  
 ..... 125°C R/R, standby rating @ 35°C amb.  
 ..... 100°C R/R, prime rating @ 35°C amb.  
 Bearing ..... 1, Pre-lubed and sealed  
 Power Leads ..... 12 Leads re-connectable for three phase  
 ..... And 4 Leads for dedicated single phase  
 Coupling ..... Direct flexible disc.  
 Total Harmonic Distortion ..... Max 3½% (MIL-STD705B)  
 Telephone Interference Factor ..... Max 50 (NEMA MG1-22)  
 Deviation Factor ..... Max 5% (MIL-STD 405B)  
 Alternator ..... Self ventilating and drip-proof  
 Ltd. Standby Warranty ..... 24 Months or 1000 hrs., first to occur  
 Ltd. Prime Warranty ..... 12 Months or 1000 hrs., first to occur

## GENERATOR FEATURES

- Full alternator protection with SENTINEL III controller, having UL-508 certification.
- Automatic voltage regulator with over-excitation, under-frequency compensation, under-speed protection, and EMI filtering. Entire solid-state board is encapsulated for moisture protection.
- Alternator power ratings are based on temperature rise, measured by resistance method, as defined in MIL-STD 705C and IEEE STD 115, Method 6.4.4.
- Power ratings will not exceed temperature rise limitation for class H insulation as per NEMA MG1-22.40.
- Insulation resistance to ground, exceeds 1.5 meg-ohm.
- Stator receives 2000 V. hi-potential test on main windings, and rotor windings receive a 1500 V. hi-potential test, as per MIL-STD 705B.
- Full amortisseur windings with UL-1446 listing on all alternators.
- Complete engine-alternator torsional acceptance, confirmed during initial prototype testing.
- Full load testing on all engine-alternator sets, before shipping.

## ENGINE SPECIFICATIONS AND APPLICATIONS DATA

### ENGINE

Manufacturer ..... General Motors  
 Model and Type ..... Vortec, 3.0L, 4 cycle  
 Aspiration ..... Naturally  
 Cylinder Arrangement ..... 4 Cylinders, In-Line  
 Displacement Cu. In. (Liters) ..... 181 (3.0)  
 Bore & Stroke In. (Cm.) ..... 4 (10.2) & 3.6 (9.1)  
 Compression Ratio ..... 9.3:1  
 Main Bearings & Style ..... 4, Babbitt  
 Cylinder Head ..... Cast Iron  
 Pistons ..... 4, Silicon Aluminum  
 Crankshaft ..... Nodular Iron  
 Exhaust Valve ..... Forged Steel  
 Governor ..... Electronic  
 Frequency Reg. (no load-full load) ..... Isochronous  
 Frequency Reg. (steady state) ..... ± ½%  
 Air Cleaner ..... Dry, Replaceable Cartridge  
 Oil Filter ..... 1, Replaceable Spin-On  
 Ltd. Warranty ..... 12 Months or 2000 hrs., first to occur  
**Speed ..... 60 HZ ..... 50 HZ**  
 Rated RPM ..... 1800 ..... 1500  
 Piston Speed, ft/min (m./min) ..... 992 (302) ..... 827 (252)  
 Max Power, bhp (kw) Standby /LPG\* ..... 45 (33) ..... 35 (26)  
 Max Power, bhp (kw) Prime /LPG\* ..... 41 (31) ..... 33 (25)  
 BMEP: psi (kpa) Standby ..... 105 (724) ..... 84 (578)  
 BMEP: psi (kpa) Prime ..... 102 (703) ..... 82 (563)  
 \*Derate LPG bhp (kw) ratings by 5% for natural gas ratings.

### UEL SYSTEM

Type ..... LPG or NAT. GAS, Vapor Withdrawal  
 Fuel Pressure (kpa), in. H<sub>2</sub>O ..... (1.74-2.74), 7"-15"  
 Secondary Fuel Regulator ..... LPG or NG Vapor System  
 Auto Fuel Lock-Off Solenoid ..... Standard on all sets

### FUEL CONSUMPTION

|       |           | LP GAS: FT <sup>3</sup> /HR (M <sup>3</sup> /HR)      | 60 HZ     | 50 HZ     |
|-------|-----------|-------------------------------------------------------|-----------|-----------|
| STDBY | 100% LOAD |                                                       | 144 (4.1) | 115 (3.5) |
|       | 75% LOAD  |                                                       | 104 (2.9) | 84 (2.5)  |
|       | 50% LOAD  |                                                       | 92 (2.6)  | 74 (2.0)  |
| PRIME | 100% LOAD |                                                       | 135 (3.7) | 108 (3.3) |
|       | 75% LOAD  |                                                       | 98 (2.8)  | 79 (2.3)  |
|       | 50% LOAD  |                                                       | 87 (2.4)  | 70 (1.8)  |
|       |           | <b>LPG = 2500 BTU X FT<sup>3</sup> = Total BTU/HR</b> |           |           |

|       |           | NAT. GAS: FT <sup>3</sup> /HR (M <sup>3</sup> /HR)   | 60 HZ      | 50 HZ     |
|-------|-----------|------------------------------------------------------|------------|-----------|
| STDBY | 100% LOAD |                                                      | 360 (10.2) | 288 (8.2) |
|       | 75% LOAD  |                                                      | 260 (7.4)  | 208 (5.8) |
|       | 50% LOAD  |                                                      | 230 (6.5)  | 184 (5.2) |
| PRIME | 100% LOAD |                                                      | 324 (9.2)  | 259 (7.7) |
|       | 75% LOAD  |                                                      | 234 (6.7)  | 187 (5.5) |
|       | 50% LOAD  |                                                      | 207 (6.1)  | 166 (4.8) |
|       |           | <b>NG = 1000 BTU X FT<sup>3</sup> = Total BTU/HR</b> |            |           |

### OIL SYSTEM

Type ..... Full Pressure  
 Oil Pan Capacity qt. (L) ..... 3.7 (3.5)  
 Oil Pan Cap. W/ filter qt. (L) ..... 5.2 (4.7)

### ELECTRICAL SYSTEM

Ignition System ..... Electronic  
 Eng. Alternator:  
 Ground ..... Negative  
 Volts DC ..... 12  
 Max. Amp Output ..... 70  
 Recommended Battery: ..... 12 VDC, 55 Amp/Hr, Size BCI# 27f,  
 ..... 12½"lg X 6¾"wi X 9"hi, with round posts & neg. ground  
 ..... Cold-Cranking amps at 0°F (-17.8°C) : 660 CCA  
 Eng. Starter Motor ..... 12 VDC

## COOLING SYSTEM

|                                                                                                           |                                 |
|-----------------------------------------------------------------------------------------------------------|---------------------------------|
| Type of System .....                                                                                      | Pressurized, closed recovery    |
| Coolant Pump .....                                                                                        | Pre-lubricated, self-sealing    |
| Cooling Fan Type (no. of blades) .....                                                                    | Pusher (10)                     |
| Fan Diameter inches (cm) .....                                                                            | 18" (46)                        |
| Ambient Capacity of Radiator °F (°C) .....                                                                | 125 (51.6)                      |
| Engine Jacket Coolant Capacity Gal (L) .....                                                              | 1.0 (3.8)                       |
| Radiator Coolant Capacity Gal. (L) .....                                                                  | 2.3 (8.7)                       |
| Maximum Restriction of Cooling Air Intake and discharge side of radiator in. H <sub>2</sub> O (kpa) ..... | .5 (.125)                       |
| <b>Speed</b> .....                                                                                        | <b>60 HZ</b> ..... <b>50 HZ</b> |
| Water Pump Capacity gpm (L/min) .....                                                                     | 18.2 (69).....15.5 (59)         |
| Heat Rejection Coolant : Btum (kw).....                                                                   | 1445 (25).....1228 (21)         |

Note: Coolant temp. shut-down switch setting at 212°F (100°C) with 50/50 (water/antifreeze) mix.

## AIR REQUIREMENTS

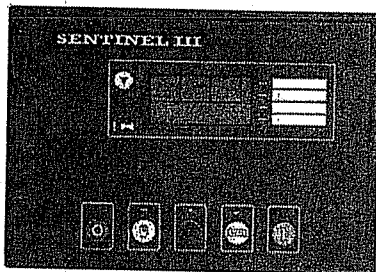
|                                                   |                                 |
|---------------------------------------------------|---------------------------------|
| <b>Speed</b> .....                                | <b>60 HZ</b> ..... <b>50 HZ</b> |
| Radiator Air Flow cfm (m <sup>3</sup> /min) ..... | 4800 (137).....4000 (117)       |
| Combustion Air cfm (m <sup>3</sup> /min) .....    | 94 (2.7).....75 (2.2)           |
| Heat Rejected to Ambient:                         |                                 |
| Engine: kw (btu/min) .....                        | 12.5 (713).....10.6 (606)       |
| Alternator: kw (btu/min) .....                    | 4.0 (245).....3.4 (208)         |

## EXHAUST SYSTEM

|                                                      |                                 |
|------------------------------------------------------|---------------------------------|
| Emissions; HC : g/hp-hr .....                        | 59-92*                          |
| Emissions; CO : g/hp-hr .....                        | 1380-4600*                      |
| Emissions; NoX : g/hp-hr .....                       | 87-239*                         |
| Muffler Inlet – Outlet Size .....                    | 2"                              |
| Max. Back Pressure hg .....                          | 2"                              |
| <b>Speed</b> .....                                   | <b>60 HZ</b> ..... <b>50 HZ</b> |
| Exhaust Flow, stby kw: cfm (m <sup>3</sup> /min) ... | 289 (8.2).....231 (6.5)         |
| Exhaust Temp., stby kw: °F (°C) .....                | 1200 (648).....1100 (593)       |

\*Engine manufacturer's estimated range.

# SENTINEL III & IV® DIGITAL MICROPROCESSOR CONTROLLERS



### SENTINEL III®\*

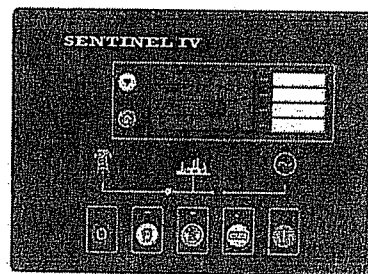
A field programmable microprocessor controller as standard equipment on all 4-pole gen-sets. This solid-state module automatically starts and stops the engine, indicates operational status and

fault conditions, by means of a graphical LCD display and flashing LED. This controller provides: Generator Volts (L1-N, L2-N, L3-N) and (L1-L2, L2-L3, L3-L1) • Generator Amps (L1, L2, L3) • Generator Frequency (HZ) • Engine Speed (RPM) • Engine Oil Pressure (PSI or BAR) • Engine Temperature (C and F) • Starting Battery Volts • Engine Run Time (Hours) • Scroll Button • Push Buttons for Manual On – Manual Off – Manual Operation – Auto Operation – Programming. These displays are supplemented further by LCD icon displays for various engine alarms. \*New for the fall of 2003.

Multiple alarm channels are provided to monitor the following: Under and Over Speed • Charge Alternator Failure • Emergency Stop • Low Oil Pressure • High Engine Temperature • Fail to Start • Fail to Come to Rest • Loss of Speed Sensing Signal. All alarms are indicated by an LCD icon and LED light.

### CONTROLLER FEATURES

- Microprocessor Based Design
- Programmable Operations
- Auto Engine Starting and Stopping
- Custom Graphical Icon Display
- Provides Engine and Generator Instrumentation
- Provides Engine Alarms and Status Information
- Configurable Inputs, Outputs, Alarms, and Timers
- LED and LCD alarm Indications
- Compatible with SENTINEL IV for easy upgrade



### SENTINEL IV®

This is an upgrade to SENTINEL III, having the same features, plus the following: Monitors utility power supply • Remote communication via optional RS232 port (RS485 porting available

– consult factory) • This module can also signal cell phones using GSM SMS message system, to report faults • Use this controller in conjunction with remote annunciators (see optional part # S-19)

## SOUND LEVELS

|                                             | Open Set  | Std. Encl. | Super-Silent Encl. |
|---------------------------------------------|-----------|------------|--------------------|
| dB(A), Industrial Muffler, no load .....    | 78.....72 | 72.....69  |                    |
| dB(A), Industrial Muffler, full load .....  | 80.....74 | 74.....71  |                    |
| dB(A), Residential Muffler, no load .....   | 76.....70 | 70.....66  |                    |
| dB(A), Residential Muffler, full load ..... | 78.....72 | 72.....68  |                    |
| dB(A), Critical Muffler, no load .....      | 73.....67 | 67.....64  |                    |
| dB(A), Critical Muffler, full load .....    | 75.....69 | 69.....66  |                    |

Note: Open sets (no enclosure) has loose flexible exhaust hose and loose industrial muffler, ready for installation by others. Standard enclosure has installed industrial muffler. Super-Silent enclosure has installed residential muffler. All gen-sets are available with optional residential or critical grade mufflers. Reduce all sound levels by 5% for 50 HZ, 1500 RPM operation. Sound tests are taken at 21 ft. (3 m) from source of noise.

## DERATE GENERATOR FOR ALTITUDE

3% per 1000 ft. above 3000 ft. from sea level  
3% per 305 meters above 914 meters from sea level

## DERATE GENERATOR FOR TEMPERATURE

2% per 10°F above 85°F  
2% per 12°C above 30°C

## DIMENSIONS AND WEIGHTS

|                            | Open Set        | Standard Enclosure | Super-Silent Enclosure |
|----------------------------|-----------------|--------------------|------------------------|
| Length in (cm) .....       | 50 (127).....   | 74 (188).....      | 92 (234)               |
| Width in (cm) .....        | 32 (81).....    | 36 (92).....       | 36 (92)                |
| Height in (cm) .....       | 34 (86).....    | 53 (134).....      | 53 (134)               |
| Net Weight lbs (kg) .....  | 945 (429).....  | 1345 (610).....    | 1530 (694)             |
| Ship Weight lbs (kg) ..... | 1045 (474)..... | 1445 (655).....    | 1630 (739)             |

# STANDARD AND OPTIONAL FEATURES FOR MODEL SP-300

## STANDARD FEATURES

### CONTROL PANEL:

- SENTINEL III® programmable microprocessor with logic and digital LCD display features:
  - AC volts, amps, frequency, oil pressure, engine temperature, DC volts, engine run hours, and additional display symbols for a wide variety of protective shutdowns.
  - Automatic shutdowns include: under and over speed, under and over volts, high engine temperature, low oil pressure, and engine over-crank.

### GENERATOR:

- AC generator • shunt excited • brushless design • single bearing • direct connection to engine with flex disc • class H, 180°C insulation • self ventilated • drip proof construction

### VOLTAGE REGULATOR:

- ½% Voltage regulation • EMI filter • under-speed protection • over-excitation protection • total encapsulation

### ELECTRICAL:

- Battery tray • battery cables • battery hold down straps

### SUPPORT:

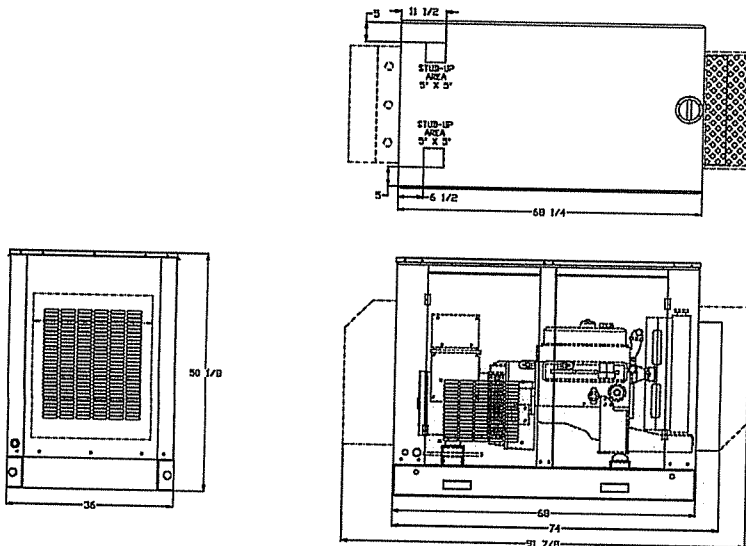
- Operation, maintenance, and installation literature.
- Call 1-800-777-9639 or Fax 1-574-262-1840
- E-mail : [engineering@gillettegenerators.com](mailto:engineering@gillettegenerators.com)
- Web : [www.gillettegenerators.com](http://www.gillettegenerators.com)

### ENGINE:

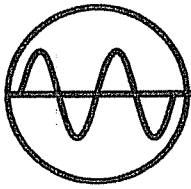
- Full flow oil filter • air filter • oil pump • solenoid type starter motor • hi-temp radiator • jacket water pump
- thermostat • pusher fan and guard • exhaust manifold
- silencer • 12 VDC battery charging alternator • flexible exhaust connector • "Isochronous" duty, electronic governor • secondary dry fuel regulator • dry fuel lock-off solenoid • vibration isolators • closed coolant recovery system with 50/50 water to anti-freeze mixture

## ACCESSORY ITEMS

- Engine Coolant Heater with automatic 60°F on, 80°F off, thermostat
- Starting Battery Heater Blanket with automatic 60°F on, 80°F off, thermostat
- Starting Battery (size BCI# 27f, 660 CCA, 12 VDC)
- Battery Charger, float type, 12 VDC at max. charge, with ammeter.
- Battery Charger, float type, 12 VDC at max. charge, with ammeter and voltmeter, meeting NFPA-110 requirements.
- Radiator for dirty environment
- Flexible Oil Drain hose with on-off valve
- Flexible Radiator Drain hose with on-off valve
- External Permanent Magnet Generator (PMG) for increased induction motor starting capacity.
- Exhaust Silencer (Residential Grade) installed inside or outside (underline one) weather housing. Note: This muffler style (mounted outside housing) is standard equipment on Super-Silent housings.
- Exhaust Silencer (Critical Grade) installed inside or outside (underline one) weather housing.
- Circuit Breaker. (Choice of mounted or loose)
- Circuit Breaker with NEMA-3R Enclosure. Note: These breakers are shipped loose for installation in remote outside area by others.
- Single or Three Phase Windings, 50 or 60 Hertz.
- SENTINEL IV Controller with all features of Sentinel III, plus allowing full telemetry remote control annunciation, and utility power monitoring.
- Remote annunciator for up to (10) reporting functions. An additional relay expansion module, plus a second annunciator adds another (10) reporting functions. Note: SENTINEL IV must be selected, to achieve remote annunciation.
- All aluminum weather and sound deadening housing for coastal areas. (allow 8-10 weeks for special order)



Exhaust system mounted on roof, not shown. Design & specifications subject to change without prior notice. Dimensions shown are approximate. Contact Gillette for certified drawings. DO NOT USE DIMENSIONS FOR INSTALLATION PURPOSES.



# SENTRY-PRO POWER SYSTEMS

By Gillette Generators, Inc.

MODEL  
**SP-420**

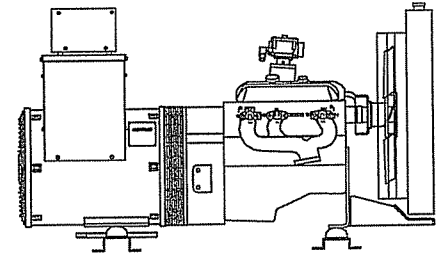
## LIQUID COOLED LPG/NG ENGINE GENERATOR SET

### KW POWER RATINGS RANGE

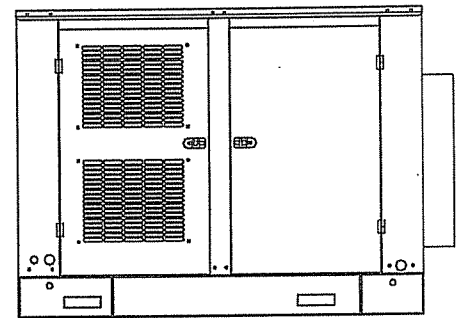
| Model | MAXIMUM<br>150°C RISE |     | STANDBY<br>125°C RISE |       | PRIME<br>105°C RISE |       |       |
|-------|-----------------------|-----|-----------------------|-------|---------------------|-------|-------|
|       | HZ                    | LPG | N.G.                  | LPG   | N.G.                | LPG   | N.G.  |
|       | <b>SP-420</b>         | 60  | 42                    | 40    | 39-40               | 38    | 36    |
|       | 50                    | 34  | 32                    | 29-32 | 30                  | 27-29 | 25-26 |

### STANDARD FEATURES

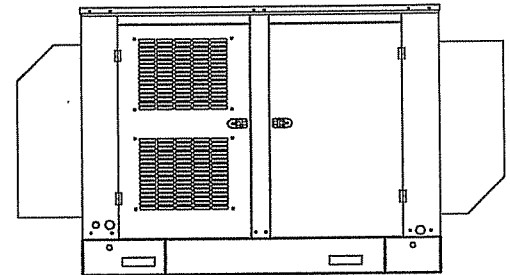
- All generator sets are USA prototype built and thoroughly tested. Production models are USA factory built and 100% load tested.
- All generator sets will accept 100% rated load in one step, per NFPA-110.
- All generators are UL-1446 certified.
- Solid state, frequency compensated voltage regulation is standard on all gen-sets.
- Electronic engine governor incorporates a throttle body actuator, which allows precise isochronous frequency regulation.
- A brushless rotating field generator design with shunt wound excitation system and connectable at a broad range of voltages.
- SENTINEL III provides programmable microprocessor logic and digital display for different engine and generator functions, plus automatic fault shutdowns.
- The heavy duty, rugged gas engine is capable of delivering rated power at 1800 RPM (60 HZ) or 1500 RPM (50 HZ).
- All generator set control systems components and accessories provide a 1-year limited warranty at time of initial start-up. Generators and engines are governed by separate warranties.
- "OPEN" Generator Sets: There is no enclosure, so gen-set must be placed within a weather protected area, un-inhabited by humans or animals, with proper ventilation. Muffler and flexible exhaust hose are supplied loose for final exhaust installation by others.
- "STANDARD" Housing: Full weather protection and average sound attenuation for normal applications.
- "SUPER-SILENT" Housing: Full weather protection and superior sound attenuation for specific low noise applications. (See "Sound Level" chart).



"OPEN" GEN-SET



"STANDARD" HOUSED GEN-SET



"SUPER-SILENT" HOUSED GEN-SET

### GENERATOR RATINGS

| GENERATOR MODEL | VOLTAGE |     | PH | HZ | LIQUID PROPANE GAS FUEL   |     |                           |     |                         |     | NATURAL GAS FUEL          |     |                           |     |                         |     |
|-----------------|---------|-----|----|----|---------------------------|-----|---------------------------|-----|-------------------------|-----|---------------------------|-----|---------------------------|-----|-------------------------|-----|
|                 | L-N     | L-L |    |    | 150°C RISE MAXIMUM RATING |     | 125°C RISE STANDBY RATING |     | 105°C RISE PRIME RATING |     | 150°C RISE MAXIMUM RATING |     | 125°C RISE STANDBY RATING |     | 105°C RISE PRIME RATING |     |
|                 |         |     |    |    | KW/KVA                    | AMP | KW/KVA                    | AMP | KW/KVA                  | AMP | KW/KVA                    | AMP | KW/KVA                    | AMP | KW/KVA                  | AMP |
| SP-420-1-1      | 120     | 240 | 1  | 60 | 42/42                     | 175 | 39/39                     | 163 | 36/36                   | 150 | 40/40                     | 167 | 38/38                     | 158 | 33/33                   | 138 |
| SP-420-3-2      | 120     | 208 | 3  | 60 | 42/52.5                   | 146 | 40/50                     | 139 | 36/45                   | 125 | 40/50                     | 139 | 38/47.5                   | 132 | 33/41                   | 115 |
| SP-420-3-3      | 120     | 240 | 3  | 60 | 42/52.5                   | 126 | 40/50                     | 120 | 36/45                   | 109 | 40/50                     | 120 | 38/47.5                   | 114 | 33/41                   | 100 |
| SP-420-3-4      | 277     | 480 | 3  | 60 | 42/52.5                   | 63  | 40/50                     | 60  | 36/45                   | 54  | 40/50                     | 60  | 38/47.5                   | 57  | 33/41                   | 50  |
| SP-420-3-5      | 127     | 220 | 3  | 60 | 42/52.5                   | 138 | 40/50                     | 131 | 36/45                   | 118 | 40/50                     | 131 | 38/47.5                   | 125 | 33/41                   | 109 |
| SP-420-1-1-5    | 110     | 220 | 1  | 50 | 32/32                     | 146 | 29/29                     | 132 | 27/27                   | 123 | 32/32                     | 146 | 30/30                     | 136 | 25/25                   | 114 |
| SP-420-3-2-5    | 110     | 220 | 3  | 50 | 34/42.5                   | 112 | 32/40                     | 105 | 29/36                   | 95  | 32/40                     | 105 | 30/37.5                   | 99  | 26/32.5                 | 85  |
| SP-420-3-3-5    | 219     | 380 | 3  | 50 | 34/42.5                   | 65  | 32/40                     | 61  | 29/36                   | 55  | 32/40                     | 61  | 30/37.5                   | 57  | 26/32.5                 | 50  |
| SP-420-3-4-5    | 240     | 415 | 3  | 50 | 34/42.5                   | 59  | 32/40                     | 56  | 29/36                   | 50  | 32/40                     | 56  | 30/37.5                   | 52  | 26/32.5                 | 45  |
| SP-420-3-5-5    | 231     | 400 | 3  | 50 | 34/42.5                   | 61  | 32/40                     | 58  | 29/36                   | 52  | 32/40                     | 58  | 30/37.5                   | 54  | 26/32.5                 | 47  |

RATINGS: All single phase gen-sets are rated at unity (1.0) power factor. All three phase gen-sets are rated at .8 power factor. "MAXIMUM RATINGS" are for short period running, not exceeding 1 hour. "STANDBY RATINGS" are strictly for gen-sets that are used for back-up emergency power to a failed normal utility power source. This standby rating allows varying loads, with no overload capability, for the entire duration of utility power outage. "PRIME RATINGS" are strictly for gen-sets that provide the prime source of electric power, where normal utility power is unavailable or unreliable. A 10% overload is allowed for a total of 1 hour, within every 12 hours of operation. All gen-set power ratings are based on temperature rise measured by resistance method as defined by MIL-STD 705C and IEEE STD 115, METHOD 6.4.4. All generators have class H (180°C) insulation system on both rotor and stator windings. All factory tests and KW/KVA charts shown above are based on 150°C (maximum), 125°C (standby), and 100°C (prime) R/R winding temperature, within a maximum 35°C ambient condition. Generators operated at maximum power ratings will not exceed the temperature rise limitation for class H insulation system, as specified in NEMA MG1-22.40. Specifications & ratings are subject to change without prior notice.

# APPLICATION AND ENGINEERING DATA FOR MODEL SP-420

## GENERATOR SPECIFICATIONS

Type ..... 4 Pole, revolving field design  
 Exciter ..... Brushless, shunt excited  
 Voltage Regulator ..... Solid State, HZ/Volts  
 Voltage Regulation ..... ½%, No load to full load  
 Frequency ..... Field convertible, 60 HZ to 50 HZ  
 Frequency Regulation ..... ½% (½ cycle, no load to full load)  
 Unbalanced Load Capability ..... 100% of nameplate rating  
 Motor Starting ..... 35% Dip on specific voltages  
 Total Stator and Load Insulation ..... Class H, 180°C  
 Temperature Rise ..... 150°C R/R, maximum rating @ 35°C amb.  
 ..... 125°C R/R, standby rating @ 35°C amb.  
 ..... 100°C R/R, prime rating @ 35°C amb.  
 Bearing ..... 1, Pre-lubed and sealed  
 Power Leads ..... 12 Leads re-connectable for three phase  
 ..... And 4 Leads for dedicated single phase  
 Coupling ..... Direct flexible disc.  
 Total Harmonic Distortion ..... Max 3½% (MIL-STD705B)  
 Telephone Interference Factor ..... Max 50 (NEMA MG1-22)  
 Deviation Factor ..... Max 5% (MIL-STD 405B)  
 Alternator ..... Self ventilating and drip-proof  
 Ltd. Standby Warranty ..... 24 Months or 1000 hrs., first to occur  
 Ltd. Prime Warranty ..... 12 Months or 1000 hrs., first to occur

## GENERATOR FEATURES

- Full alternator protection with SENTINEL III controller, having UL-508 certification.
- Automatic voltage regulator with over-excitation, under-frequency compensation, under-speed protection, and EMI filtering. Entire solid-state board is encapsulated for moisture protection.
- Alternator power ratings are based on temperature rise, measured by resistance method, as defined in MIL-STD 705C and IEEE STD 115, Method 6.4.4.
- Power ratings will not exceed temperature rise limitation for class H insulation as per NEMA MG1-22.40.
- Insulation resistance to ground, exceeds 1.5 meg-ohm.
- Stator receives 2000 V. hi-potential test on main windings, and rotor windings receive a 1500 V. hi-potential test, as per MIL-STD 705B.
- Full amortisseur windings with UL-1446 listing on all alternators.
- Complete engine-alternator torsional acceptance, confirmed during initial prototype testing.
- Full load testing on all engine-alternator sets, before shipping.

## ENGINE SPECIFICATIONS AND APPLICATIONS DATA

### ENGINE

Manufacturer ..... General Motors  
 Model and Type ..... Vortec, 4.3L, 4 cycle  
 Aspiration ..... Naturally  
 Cylinder Arrangement ..... 6 Cylinders, V-6  
 Displacement Cu. In. (Liters) ..... 262 (4.3)  
 Bore & Stroke In. (Cm.) ..... 4 (10.2) & 3.48 (8.4)  
 Compression Ratio ..... 9.05:1  
 Main Bearings & Style ..... 4, Babbitt  
 Cylinder Head ..... Cast Iron  
 Pistons ..... 6, Silicon Aluminum  
 Crankshaft ..... Nodular Iron  
 Exhaust Valve ..... Forged Steel  
 Governor ..... Electronic  
 Frequency Reg. (no load-full load) ..... Isochronous  
 Frequency Reg. (steady state) ..... ± ½%  
 Air Cleaner ..... Dry, Replaceable Cartridge  
 Oil Filter ..... 1, Replaceable Spin-On  
 Ltd. Warranty ..... 12 Months or 2000 hrs., first to occur  
 Speed ..... **60 HZ** ..... **50 HZ**  
 Rated RPM ..... 1800 ..... 1500  
 Piston Speed, ft/min (m./min) ..... 1044 (318) ..... 870 (265)  
 Max Power, bhp (kw) Standby /LPG\* ..... 67 (51) ..... 54 (41)  
 Max Power, bhp (kw) Prime /LPG\* ..... 60 (46) ..... 48 (37)  
 BMEP: psi (kpa) Standby ..... 113 (779) ..... 90.5 (623)  
 BMEP: psi (kpa) Prime ..... 102 (701) ..... 81.5 (561)

\*Derate LPG bhp (kw) ratings by 5% for natural gas ratings.

### FUEL SYSTEM

Type ..... LPG or NAT. GAS, Vapor Withdrawal  
 Fuel Pressure (kpa), in. H<sub>2</sub>O ..... (1.74-2.74), 7"-15"  
 Secondary Fuel Regulator ..... LPG or NG Vapor System  
 Auto Fuel Lock-Off Solenoid ..... Standard on all sets

### FUEL CONSUMPTION

|                                                          |  | LP GAS: FT <sup>3</sup> /HR (M <sup>3</sup> /HR) | 60 HZ      | 50 HZ      |
|----------------------------------------------------------|--|--------------------------------------------------|------------|------------|
| STDBY                                                    |  | 100% LOAD                                        | 197 (5.6)  | 158 (4.5)  |
|                                                          |  | 75% LOAD                                         | 172 (4.9)  | 138 (3.9)  |
|                                                          |  | 50% LOAD                                         | 122 (3.4)  | 98 (2.7)   |
| PRIME                                                    |  | 100% LOAD                                        | 177 (5.0)  | 142 (4.05) |
|                                                          |  | 75% LOAD                                         | 155 (4.4)  | 124 (3.5)  |
|                                                          |  | 50% LOAD                                         | 110 (3.06) | 88 (2.4)   |
| <b>LPG = 2500 BTU X FT<sup>3</sup>/HR = Total BTU/HR</b> |  |                                                  |            |            |

|                                                         |  | NAT. GAS: FT <sup>3</sup> /HR (M <sup>3</sup> /HR) | 60 HZ      | 50 HZ      |
|---------------------------------------------------------|--|----------------------------------------------------|------------|------------|
| STDBY                                                   |  | 100% LOAD                                          | 480 (13.6) | 384 (10.9) |
|                                                         |  | 75% LOAD                                           | 421 (12.0) | 337 (9.6)  |
|                                                         |  | 50% LOAD                                           | 296 (8.3)  | 237 (6.6)  |
| PRIME                                                   |  | 100% LOAD                                          | 432 (12.2) | 346 (9.8)  |
|                                                         |  | 75% LOAD                                           | 379 (10.8) | 303 (8.6)  |
|                                                         |  | 50% LOAD                                           | 267 (7.5)  | 214 (6.0)  |
| <b>NG = 1000 BTU X FT<sup>3</sup>/HR = Total BTU/HR</b> |  |                                                    |            |            |

### OIL SYSTEM

Type ..... Full Pressure  
 Oil Pan Capacity qt. (L) ..... 4.5 (4.3)  
 Oil Pan Cap. W/ filter qt. (L) ..... 6.0 (5.7)

### ELECTRICAL SYSTEM

Ignition System ..... Electronic  
 Eng. Alternator:  
     Ground ..... Negative  
     Volts DC ..... 12  
     Max. Amp Output ..... 70  
 Recommended Battery: ..... 12 VDC, 70 Amp/Hr, Size BCI# 29h,  
 ..... 13"lg X 6¾"wi X 9"hi, with round posts & neg. ground  
 ..... Cold-Cranking amps at 0°F (-17.8°C) : 840 CCA  
 Eng. Starter Motor ..... 12 VDC



## COOLING SYSTEM

|                                                                                                             |                                 |
|-------------------------------------------------------------------------------------------------------------|---------------------------------|
| Type of System .....                                                                                        | Pressurized, closed recovery    |
| Coolant Pump .....                                                                                          | Pre-lubricated, self-sealing    |
| Cooling Fan Type (no. of blades) .....                                                                      | Pusher (10)                     |
| Fan Diameter inches (cm) .....                                                                              | 21" (533)                       |
| Ambient Capacity of Radiator °F (°C).....                                                                   | 125 (51.6)                      |
| Engine Jacket Coolant Capacity Gal (L).....                                                                 | 1.8 (6.8)                       |
| Radiator Coolant Capacity Gal. (L).....                                                                     | 4.7 (17.8)                      |
| Maximum Restriction of Cooling Air Intake<br>and discharge side of radiator in. H <sub>2</sub> O (kpa)..... | .5 (.125)                       |
| <b>Speed .....</b>                                                                                          | <b>60 HZ .....</b> <b>50 HZ</b> |
| Water Pump Capacity gpm (L/min).....                                                                        | 31 (120)..... 26 (102)          |
| Heat Rejection Coolant : Btu/m (kw).....                                                                    | 1850 (33)..... 1573 (28)        |

Note: Coolant temp. shut-down switch setting at 212°F (100°C) with 50/50 (water/antifreeze) mix.

## AIR REQUIREMENTS

|                                                  |                                 |
|--------------------------------------------------|---------------------------------|
| <b>Speed .....</b>                               | <b>60 HZ .....</b> <b>50 HZ</b> |
| Radiator Air Flow cfm (m <sup>3</sup> /min)..... | 7600 (220)..... 6080 (136)      |
| Combustion Air cfm (m <sup>3</sup> /min) .....   | 136 (3.9)..... 109 (3.1)        |
| Heat Rejected to Ambient:                        |                                 |
| Engine: kw (btu/min).....                        | 16 (915)..... 13.5 (778)        |
| Alternator: kw (btu/min).....                    | 6 (395)..... 5 (319)            |

## EXHAUST SYSTEM

|                                                       |                                 |
|-------------------------------------------------------|---------------------------------|
| Emissions; HC : g/hp-hr.....                          | 83-128*                         |
| Emissions; CO : g/hp-hr.....                          | 1920-6400*                      |
| Emissions; NoX : g/hp-hr .....                        | 122-333*                        |
| Muffler Inlet – Outlet Size .....                     | 2.5"                            |
| Max. Back Pressure hg .....                           | 2"                              |
| <b>Speed .....</b>                                    | <b>60 HZ .....</b> <b>50 HZ</b> |
| Exhaust Flow, stby kw: cfm (m <sup>3</sup> /min) .... | 325 (9)..... 276 (7.5)          |
| Exhaust Temp., stby kw: °F (°C) .....                 | 1350 (732)..... 1200 (649)      |

\*Engine manufacturer's estimated range.

## SOUND LEVELS

|                                            | Open<br>Set | Std.<br>Encl. | Super-<br>Silent<br>Encl. |
|--------------------------------------------|-------------|---------------|---------------------------|
| dB(A), Industrial Muffler, no load.....    | 80.....     | 74 .....      | 71                        |
| dB(A), Industrial Muffler, full load ..... | 83.....     | 76 .....      | 73                        |
| dB(A), Residential Muffler, no load .....  | 78.....     | 72 .....      | 68                        |
| dB(A), Residential Muffler, full load..... | 80.....     | 74 .....      | 70                        |
| dB(A), Critical Muffler, no load .....     | 75.....     | 69 .....      | 66                        |
| dB(A), Critical Muffler, full load.....    | 77.....     | 71 .....      | 68                        |

Note: Open sets (no enclosure) has loose flexible exhaust hose and loose industrial muffler, ready for installation by others. Standard enclosure has installed industrial muffler. Super-Silent enclosure has installed residential muffler. All gen-sets are available with optional residential or critical grade mufflers. Reduce all sound levels by 5% for 50 HZ, 1500 RPM operation. Sound tests are taken at 21 ft. (3 m) from source of noise.

## DERATE GENERATOR FOR ALTITUDE

3% per 1000 ft. above 3000 ft. from sea level  
3% per 305 meters above 914 meters from sea level

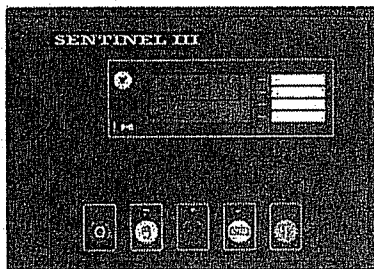
## DERATE GENERATOR FOR TEMPERATURE

2% per 10°F above 85°F  
2% per 12°C above 30°C

## DIMENSIONS AND WEIGHTS

|                            | Open<br>Set   | Standard<br>Enclosure | Super-<br>Silent<br>Enclosure |
|----------------------------|---------------|-----------------------|-------------------------------|
| Length in (cm).....        | 67 (170)..... | 84 (215) .....        | 106 (269)                     |
| Width in (cm).....         | 38 (97).....  | 42 (107) .....        | 42 (107)                      |
| Height in (cm).....        | 36 (91).....  | 53 (134) .....        | 53 (134)                      |
| Net Weight lbs (kg).....   | 1337 (606)... | 1887 (856) .....      | 2077 (942)                    |
| Ship Weight lbs (kg) ..... | 1487 (674)... | 2037 (924) .....      | 2227 (1010)                   |

## SENTINEL III & IV® DIGITAL MICROPROCESSOR CONTROLLERS



### SENTINEL III®\*

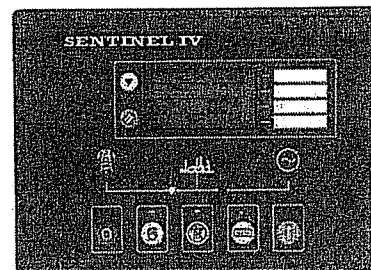
A field programmable microprocessor controller as standard equipment on all 4-pole gen-sets. This solid-state module automatically starts and stops the engine, indicates operational status and

fault conditions, by means of a graphical LCD display and flashing LED. This controller provides: Generator Volts (L1-N, L2-N, L3-N) and (L1-L2, L2-L3, L3-L1) • Generator Amps (L1, L2, L3) • Generator Frequency (HZ) • Engine Speed (RPM) • Engine Oil Pressure (PSI or BAR) • Engine Temperature (C and F) • Starting Battery Volts • Engine Run Time (Hours) • Scroll Button • Push Buttons for Manual On – Manual Off – Manual Operation – Auto Operation – Programming. These displays are supplemented further by LCD icon displays for various engine alarms. \*New for the fall of 2003.

Multiple alarm channels are provided to monitor the following: Under and Over Speed • Charge Alternator Failure • Emergency Stop • Low Oil Pressure • High Engine Temperature • Fail to Start • Fail to Come to Rest • Loss of Speed Sensing Signal. All alarms are indicated by an LCD icon and LED light.

### CONTROLLER FEATURES

- Microprocessor Based Design
- Programmable Operations
- Auto Engine Starting and Stopping
- Custom Graphical Icon Display
- Provides Engine and Generator Instrumentation
- Provides Engine Alarms and Status Information
- Configurable Inputs, Outputs, Alarms, and Timers
- LED and LCD alarm Indications
- Compatible with SENTINEL IV for easy upgrade



### SENTINEL IV®

This is an upgrade to SENTINEL III, having the same features, plus the following: Monitors utility power supply • Remote communication via optional RS232 port (RS485 porting available

– consult factory) • This module can also signal cell phones using GSM SMS message system, to report faults • Use this controller in conjunction with remote annunciators (see optional part # S-19)

# STANDARD AND OPTIONAL FEATURES FOR MODEL SP-420

## STANDARD FEATURES

### CONTROL PANEL:

- SENTINEL III<sup>®</sup> programmable microprocessor with logic and digital LCD display features:
  - AC volts, amps, frequency, oil pressure, engine temperature, DC volts, engine run hours, and additional display symbols for a wide variety of protective shutdowns.
  - Automatic shutdowns include: under and over speed, under and over volts, high engine temperature, low oil pressure, and engine over-crank.

### ENGINE:

Full flow oil filter • air filter • oil pump • solenoid type starter motor • hi-temp radiator • jacket water pump • thermostat • pusher fan and guard • exhaust manifold • silencer • 12 VDC battery charging alternator • flexible exhaust connector • "Isochronous" duty, electronic governor • secondary dry fuel regulator • dry fuel lock-off solenoid • vibration isolators • closed coolant recovery system with 50/50 water to anti-freeze mixture

### GENERATOR:

AC generator • shunt excited • brushless design • single bearing • direct connection to engine with flex disc • class H, 180°C insulation • self ventilated • drip proof construction

### VOLTAGE REGULATOR:

½% Voltage regulation • EMI filter • under-speed protection • over-excitation protection • total encapsulation

### ELECTRICAL:

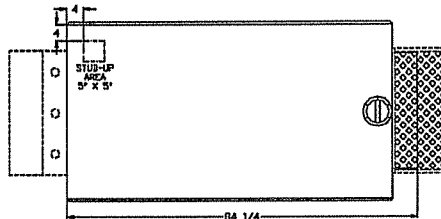
Battery tray • battery cables • battery hold down straps

### SUPPORT:

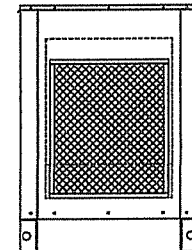
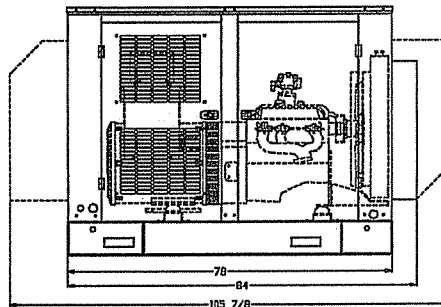
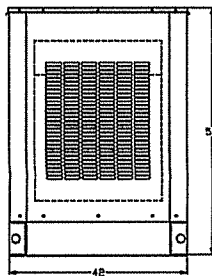
Operation, maintenance, and installation literature.  
 Call 1-800-777-9639 or Fax 1-574-262-1840  
 E-mail : [engineering@gillettegenerators.com](mailto:engineering@gillettegenerators.com)  
 Web : [www.gillettegenerators.com](http://www.gillettegenerators.com)

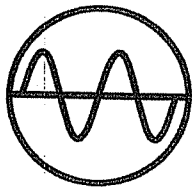
## ACCESSORY ITEMS

- Engine Coolant Heater with automatic 60°F on, 80°F off, thermostat
- Starting Battery Heater Blanket with automatic 60°F on, 80°F off, thermostat
- Starting Battery (size BCI# 27f, 660 CCA, 12 VDC)
- Battery Charger, float type, 12 VDC at max. charge, with ammeter.
- Battery Charger, float type, 12 VDC at max. charge, with ammeter and voltmeter, meeting NFPA-110 requirements.
- Radiator for dirty environment
- Flexible Oil Drain hose with on-off valve
- Flexible Radiator Drain hose with on-off valve
- External Permanent Magnet Generator (PMG) for increased induction motor starting capacity.
- Exhaust Silencer (Residential Grade) installed inside or outside (underline one) weather housing. Note: This muffler style (mounted outside housing) is standard equipment on Super-Silent housings.
- Exhaust Silencer (Critical Grade) installed inside or outside (underline one) weather housing.
- Circuit Breaker. (Choice of mounted or loose)
- Circuit Breaker with NEMA-3R Enclosure. Note: These breakers are shipped loose for installation in remote outside area by others.
- Single or Three Phase Windings, 50 or 60 Hertz.
- SENTINEL IV Controller with all features of Sentinel III, plus allowing full telemetry remote control annunciation, and utility power monitoring.
- Remote annunciator for up to (10) reporting functions. An additional relay expansion module, plus a second annunciator adds another (10) reporting functions. Note: SENTINEL IV must be selected, to achieve remote annunciation.
- All aluminum weather and sound deadening housing for coastal areas. (allow 8-10 weeks for special order)



Exhaust system mounted on roof, not shown. Design & specifications subject to change without prior notice. Dimensions shown are approximate. Contact Gillette for certified drawings. DO NOT USE DIMENSIONS FOR INSTALLATION PURPOSES.





# SENTRY-PRO POWER SYSTEMS

By Gillette Generators, Inc.

MODEL  
**SP-600**

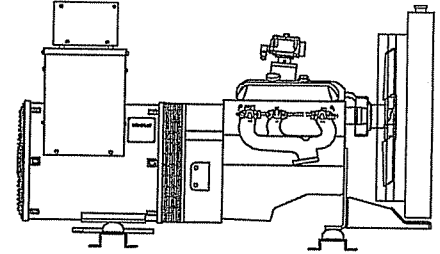
**LIQUID COOLED LPG/NG ENGINE GENERATOR SET**

## KW POWER RATINGS RANGE

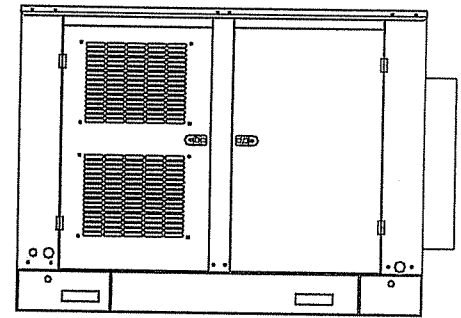
| Model | HZ | MAXIMUM<br>150°C RISE |      | STANDBY<br>125°C RISE |       | PRIME<br>105°C RISE |       |
|-------|----|-----------------------|------|-----------------------|-------|---------------------|-------|
|       |    | LPG                   | N.G. | LPG                   | N.G.  | LPG                 | N.G.  |
|       |    | <b>SP-600</b>         | 60   | 60                    | 58    | 56-58               | 54-56 |
|       | 50 | 52                    | 48   | 45-48                 | 43-46 | 44                  | 38-40 |

## STANDARD FEATURES

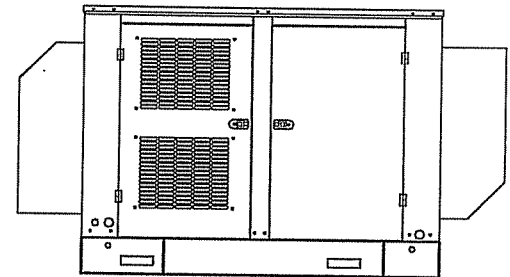
- All generator sets are USA prototype built and thoroughly tested. Production models are USA factory built and 100% load tested.
- All generator sets will accept 100% rated load in one step, per NFPA-110.
- All generators are UL-1446 certified.
- Solid state, frequency compensated voltage regulation is standard on all gen-sets.
- Electronic engine governor incorporates a throttle body actuator, which allows precise isochronous frequency regulation.
- A brushless rotating field generator design with shunt wound excitation system and connectable at a broad range of voltages.
- SENTINEL III provides programmable microprocessor logic and digital display for different engine and generator functions, plus automatic fault shutdowns.
- The heavy duty, rugged gas engine is capable of delivering rated power at 1800 RPM (60 HZ) or 1500 RPM (50 HZ).
- All generator set control systems components and accessories provide a 1-year limited warranty at time of initial start-up. Generators and engines are governed by separate warranties.
- "OPEN" Generator Sets: There is no enclosure, so gen-set must be placed within a weather protected area, un-inhabited by humans or animals, with proper ventilation. Muffler and flexible exhaust hose are supplied loose for final exhaust installation by others.
- "STANDARD" Housing: Full weather protection and average sound attenuation for normal applications.
- "SUPER-SILENT" Housing: Full weather protection and superior sound attenuation for specific low noise applications. (See "Sound Level" chart).



"OPEN" GEN-SET



"STANDARD" HOUSED GEN-SET



"SUPER-SILENT" HOUSED GEN-SET

## GENERATOR RATINGS

| GENERATOR MODEL | VOLTAGE |     | PH | HZ | LIQUID PROPANE GAS FUEL   |     |                           |     |                         |     | NATURAL GAS FUEL          |     |                           |     |                         |     |
|-----------------|---------|-----|----|----|---------------------------|-----|---------------------------|-----|-------------------------|-----|---------------------------|-----|---------------------------|-----|-------------------------|-----|
|                 |         |     |    |    | 150°C RISE MAXIMUM RATING |     | 125°C RISE STANDBY RATING |     | 105°C RISE PRIME RATING |     | 150°C RISE MAXIMUM RATING |     | 125°C RISE STANDBY RATING |     | 105°C RISE PRIME RATING |     |
|                 |         |     |    |    | KW/KVA                    | AMP | KW/KVA                    | AMP | KW/KVA                  | AMP | KW/KVA                    | AMP | KW/KVA                    | AMP | KW/KVA                  | AMP |
| SP-600-1-1      | 120     | 240 | 1  | 60 | 60/60                     | 250 | 58/58                     | 242 | 53/53                   | 221 | 58/58                     | 242 | 56/56                     | 233 | 51/51                   | 213 |
| SP-600-3-2      | 120     | 208 | 3  | 60 | 60/75                     | 208 | 56/70                     | 194 | 51/63.8                 | 177 | 58/72.5                   | 202 | 54/67.5                   | 188 | 49/61                   | 170 |
| SP-600-3-3      | 120     | 240 | 3  | 60 | 60/75                     | 181 | 58/72.5                   | 175 | 53/66                   | 160 | 58/72.5                   | 175 | 56/70                     | 168 | 51/63.8                 | 154 |
| SP-600-3-4      | 277     | 480 | 3  | 60 | 60/75                     | 90  | 58/72.5                   | 87  | 53/66                   | 80  | 58/72.5                   | 87  | 56/70                     | 84  | 51/63.8                 | 77  |
| SP-600-3-5      | 127     | 220 | 3  | 60 | 60/75                     | 197 | 58/72.5                   | 190 | 53/66                   | 174 | 58/72.5                   | 191 | 56/70                     | 184 | 51/63.8                 | 168 |
| SP-600-1-1-5    | 110     | 220 | 1  | 50 | 52/52                     | 236 | 48/48                     | 218 | 44/44                   | 200 | 48/48                     | 218 | 46/43                     | 209 | 42/42                   | 191 |
| SP-600-3-2-5    | 110     | 220 | 3  | 50 | 52/65                     | 171 | 48/60                     | 158 | 44/55                   | 145 | 48/60                     | 158 | 46/57.5                   | 151 | 42/52.5                 | 138 |
| SP-600-3-3-5    | 219     | 380 | 3  | 50 | 52/65                     | 99  | 48/60                     | 91  | 44/55                   | 84  | 48/60                     | 91  | 46/57.5                   | 75  | 42/52.5                 | 80  |
| SP-600-3-4-5    | 240     | 415 | 3  | 50 | 52/65                     | 90  | 48/60                     | 83  | 44/55                   | 76  | 48/60                     | 83  | 46/57.5                   | 80  | 42/52.5                 | 73  |
| SP-600-3-5-5    | 231     | 400 | 3  | 50 | 52/65                     | 94  | 48/60                     | 87  | 44/55                   | 80  | 48/60                     | 87  | 46/57.5                   | 83  | 42/52.5                 | 76  |

RATINGS: All single phase gen-sets are rated at unity (1.0) power factor. All three phase gen-sets are rated at .8 power factor. "MAXIMUM RATINGS" are for short period running, not exceeding 1 hour. "STANDBY RATINGS" are strictly for gen-sets that are used for back-up emergency power to a failed normal utility power source. This standby rating allows varying loads, with no overload capability, for the entire duration of utility power outage. "PRIME RATINGS" are strictly for gen-sets that provide the prime source of electric power, where normal utility power is unavailable or unreliable. A 10% overload is allowed for a total of 1 hour, within every 12 hours of operation. All gen-set power ratings are based on temperature rise measured by resistance method as defined by MIL-STD 705C and IEEE STD 115, METHOD 6.4.4. All generators have class H (180°C) insulation system on both rotor and stator windings. All factory tests and KW/KVA charts shown above are based on 150°C (maximum), 125°C (standby), and 100°C (prime) R/R winding temperature, within a maximum 35°C ambient condition. Generators operated at maximum power ratings will not exceed the temperature rise limitation for class H insulation system, as specified in NEMA MG1-22.40. Specifications & ratings are subject to change without prior notice.

# APPLICATION AND ENGINEERING DATA FOR MODEL SP-600

## GENERATOR SPECIFICATIONS

Type ..... 4 Pole, revolving field design  
 Exciter ..... Brushless, shunt excited  
 Voltage Regulator ..... Solid State, HZ/Volts  
 Voltage Regulation ..... ½%, No load to full load  
 Frequency ..... Field convertible, 60 HZ to 50 HZ  
 Frequency Regulation ..... ½% (½ cycle, no load to full load)  
 Unbalanced Load Capability ..... 100% of nameplate rating  
 Motor Starting ..... 35% Dip on specific voltages  
 Total Stator and Load Insulation ..... Class H, 180°C  
 Temperature Rise ..... 150°C R/R, maximum rating @ 35°C amb.  
 ..... 125°C R/R, standby rating @ 35°C amb.  
 ..... 100°C R/R, prime rating @ 35°C amb.  
 Bearing ..... 1, Pre-lubed and sealed  
 Power Leads ..... 12 Leads re-connectable for three phase  
 ..... And 4 Leads for dedicated single phase  
 Coupling ..... Direct flexible disc.  
 Total Harmonic Distortion ..... Max 3½% (MIL-STD705B)  
 Telephone Interference Factor ..... Max 50 (NEMA MG1-22)  
 Deviation Factor ..... Max 5% (MIL-STD 405B)  
 Alternator ..... Self ventilating and drip-proof  
 Ltd. Standby Warranty ..... 24 Months or 1000 hrs., first to occur  
 Ltd. Prime Warranty ..... 12 Months or 1000 hrs., first to occur

## GENERATOR FEATURES

- Full alternator protection with SENTINEL III controller, having UL-508 certification.
- Automatic voltage regulator with over-excitation, under-frequency compensation, under-speed protection, and EMI filtering. Entire solid-state board is encapsulated for moisture protection.
- Alternator power ratings are based on temperature rise, measured by resistance method, as defined in MIL-STD 705C and IEEE STD 115, Method 6.4.4.
- Power ratings will not exceed temperature rise limitation for class H insulation as per NEMA MG1-22.40.
- Insulation resistance to ground, exceeds 1.5 meg-ohm.
- Stator receives 2000 V. hi-potential test on main windings, and rotor windings receive a 1500 V. hi-potential test, as per MIL-STD 705B.
- Full amortisseur windings with UL-1446 listing on all alternators.
- Complete engine-alternator torsional acceptance, confirmed during initial prototype testing.
- Full load testing on all engine-alternator sets, before shipping..

## ENGINE SPECIFICATIONS AND APPLICATIONS DATA

### ENGINE

Manufacturer ..... General Motors  
 Model and Type ..... Vortec, 5.7L, 4 cycle  
 Aspiration ..... Naturally  
 Cylinder Arrangement ..... 8 Cylinders, V-8  
 Displacement Cu. In. (Liters) ..... 350 (5.7)  
 Bore & Stroke In. (Cm.) ..... 4 (10.2) & 3.48 (8.4)  
 Compression Ratio ..... 9.1:1  
 Main Bearings & Style ..... 5M 400 Copper  
 Cylinder Head ..... Cast Iron  
 Pistons ..... 8, Silicon Aluminum  
 Crankshaft ..... Nodular Iron  
 Exhaust Valve ..... Forged Steel  
 Governor ..... Electronic  
 Frequency Reg. (no load-full load) ..... Isochronous  
 Frequency Reg. (steady state) ..... ± ½%  
 Air Cleaner ..... Dry, Replaceable Cartridge  
 Oil Filter ..... 1, Replaceable Spin-On  
 Ltd. Warranty ..... 12 Months or 2000 hrs., first to occur  
**Speed** ..... **60 HZ** ..... **50 HZ**  
 Rated RPM ..... 1800 ..... 1500  
 Piston Speed, ft/min (m./min) ..... 1044 (318) ..... 870 (265)  
 Max Power, bhp (kw) Standby /LPG\* ... 105 (78) ..... 88 (66)  
 Max Power, bhp (kw) Prime /LPG\* ..... 95 (70) ..... 79 (59)  
 BMEP: psi (kpa) Standby ..... 160 (1105) ..... 128 (884)  
 BMEP: psi (kpa) Prime ..... 144 (995) ..... 115 (796)

\*Derate LPG bhp (kw) ratings by 5% for natural gas ratings.

### FUEL SYSTEM

Type ..... LPG or NAT. GAS, Vapor Withdrawal  
 Fuel Pressure (kpa), in. H<sub>2</sub>O ..... (1.74-2.74), 7"-15"  
 Secondary Fuel Regulator ..... LPG or NG Vapor System  
 Auto Fuel Lock-Off Solenoid ..... Standard on all sets

### FUEL CONSUMPTION

|                                                          |           | LP GAS: FT <sup>3</sup> /HR (M <sup>3</sup> /HR) | 60 HZ     | 50 HZ |
|----------------------------------------------------------|-----------|--------------------------------------------------|-----------|-------|
| STDBY                                                    | 100% LOAD | 330 (9.3)                                        | 280 (7.9) |       |
|                                                          | 75% LOAD  | 250 (7.1)                                        | 220 (6.2) |       |
|                                                          | 50% LOAD  | 190 (5.4)                                        | 165 (4.7) |       |
| PRIME                                                    | 100% LOAD | 298 (8.4)                                        | 256 (7.2) |       |
|                                                          | 75% LOAD  | 232 (6.6)                                        | 204 (5.8) |       |
|                                                          | 50% LOAD  | 179 (5.1)                                        | 154 (4.5) |       |
| <b>LPG = 2500 BTU X FT<sup>3</sup>/HR = Total BTU/HR</b> |           |                                                  |           |       |

|                                                         |           | NAT. GAS: FT <sup>3</sup> /HR (M <sup>3</sup> /HR) | 60 HZ      | 50 HZ |
|---------------------------------------------------------|-----------|----------------------------------------------------|------------|-------|
| STDBY                                                   | 100% LOAD | 800 (23.5)                                         | 655 (18)   |       |
|                                                         | 75% LOAD  | 695 (19.8)                                         | 560 (15.8) |       |
|                                                         | 50% LOAD  | 530 (15)                                           | 425 (12.3) |       |
| PRIME                                                   | 100% LOAD | 735 (21)                                           | 600 (17)   |       |
|                                                         | 75% LOAD  | 630 (17.8)                                         | 500 (14.2) |       |
|                                                         | 50% LOAD  | 480 (13.6)                                         | 387 (11)   |       |
| <b>NG = 1000 BTU X FT<sup>3</sup>/HR = Total BTU/HR</b> |           |                                                    |            |       |

### OIL SYSTEM

Type ..... Full Pressure  
 Oil Pan Capacity qt. (L) ..... 5.0 (4.7)  
 Oil Pan Cap. W/ filter qt. (L) ..... 6.5 (6.2)

### ELECTRICAL SYSTEM

Ignition System ..... Electronic  
 Eng. Alternator:  
     Ground ..... Negative  
     Volts DC ..... 12  
     Max. Amp Output ..... 70  
 Recommended Battery: ..... 12 VDC, 70 Amp/Hr, Size BCI# 29h,  
 ..... 13"lg X 6¾"wi X 9"hi, with round posts & neg. ground  
 ..... Cold-Cranking amps at 0°F (-17.8°C) : 840 CCA  
 Eng. Starter Motor ..... 12 VDC

## COOLING SYSTEM

|                                                                                                              |                                 |
|--------------------------------------------------------------------------------------------------------------|---------------------------------|
| Type of System .....                                                                                         | Pressurized, closed recovery    |
| Coolant Pump .....                                                                                           | Pre-lubricated, self-sealing    |
| Cooling Fan Type (no. of blades) .....                                                                       | Pusher (10)                     |
| Fan Diameter inches (cm) .....                                                                               | 21" (533)                       |
| Ambient Capacity of Radiator °F (°C) .....                                                                   | 125 (51.6)                      |
| Engine Jacket Coolant Capacity Gal (L) .....                                                                 | 1.8 (6.8)                       |
| Radiator Coolant Capacity Gal. (L) .....                                                                     | 4.7 (17.8)                      |
| Maximum Restriction of Cooling Air Intake<br>and discharge side of radiator in. H <sub>2</sub> O (kpa) ..... | .5 (.125)                       |
| <b>Speed</b> .....                                                                                           | <b>60 HZ</b> ..... <b>50 HZ</b> |
| Water Pump Capacity gpm (L/min) .....                                                                        | 27 (100) ..... 23 (85)          |
| Heat Rejection Coolant : Btum (kw) .....                                                                     | 2999 (52.7) ..... 2550 (45)     |
| Note: Coolant temp. shut-down switch setting at 212°F (100°C) with 50/50<br>(water/antifreeze) mix.          |                                 |

## AIR REQUIREMENTS

|                                                   |                                 |
|---------------------------------------------------|---------------------------------|
| <b>Speed</b> .....                                | <b>60 HZ</b> ..... <b>50 HZ</b> |
| Radiator Air Flow cfm (m <sup>3</sup> /min) ..... | 8400 (238) ..... 7140 (202)     |
| Combustion Air cfm (m <sup>3</sup> /min) .....    | 185 (5.2) ..... 155 (4.4)       |
| Heat Rejected to Ambient:                         |                                 |
| Engine: kw (btu/min) .....                        | 30.9 (1760) ..... 26 (1500)     |
| Alternator: kw (btu/min) .....                    | 7.5 (430) ..... 6.8 (375)       |

## EXHAUST SYSTEM

|                                                     |                                 |
|-----------------------------------------------------|---------------------------------|
| Emissions; HC : g/hp-hr .....                       | 127-196*                        |
| Emissions; CO : g/hp-hr .....                       | 2940-9800*                      |
| Emissions; NoX : g/hp-hr .....                      | 186-510*                        |
| Muffler Inlet – Outlet Size .....                   | 2.5"                            |
| Max. Back Pressure hg .....                         | 2"                              |
| <b>Speed</b> .....                                  | <b>60 HZ</b> ..... <b>50 HZ</b> |
| Exhaust Flow, stby kw: cfm (m <sup>3</sup> /min) .. | 558 (15.8) ..... 446 (12.6)     |
| Exhaust Temp., stby kw: °F (°C) .....               | 1200 (648) ..... 1100 (593)     |
| *Engine manufacturer's estimated range.             |                                 |

## SOUND LEVELS

|                                             | Open<br>Set | Std.<br>Encl. | Super-<br>Silent<br>Encl. |
|---------------------------------------------|-------------|---------------|---------------------------|
| dB(A), Industrial Muffler, no load .....    | 82          | 76            | 73                        |
| dB(A), Industrial Muffler, full load .....  | 85          | 78            | 76                        |
| dB(A), Residential Muffler, no load .....   | 80          | 74            | 71                        |
| dB(A), Residential Muffler, full load ..... | 83          | 76            | 73                        |
| dB(A), Critical Muffler, no load .....      | 78          | 72            | 69                        |
| dB(A), Critical Muffler, full load .....    | 80          | 74            | 71                        |

Note: Open sets (no enclosure) has loose flexible exhaust hose and loose industrial muffler, ready for installation by others. Standard enclosure has installed industrial muffler. Super-Silent enclosure has installed residential muffler. All gen-sets are available with optional residential or critical grade mufflers. Reduce all sound levels by 5% for 50 HZ, 1500 RPM operation. Sound tests are taken at 21 ft. (3 m) from source of noise.

## DERATE GENERATOR FOR ALTITUDE

3% per 1000 ft. above 3000 ft. from sea level  
3% per 305 meters above 914 meters from sea level

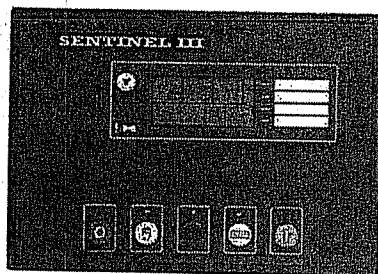
## DERATE GENERATOR FOR TEMPERATURE

2% per 10°F above 85°F  
2% per 12°C above 30°C

## DIMENSIONS AND WEIGHTS

|                            | Open<br>Set | Standard<br>Enclosure | Super-<br>Silent<br>Enclosure |
|----------------------------|-------------|-----------------------|-------------------------------|
| Length in (cm) .....       | 72 (183)    | 84 (215)              | 106 (269)                     |
| Width in (cm) .....        | 38 (97)     | 42 (107)              | 42 (107)                      |
| Height in (cm) .....       | 38 (97)     | 53 (134)              | 53 (134)                      |
| Net Weight lbs (kg) .....  | 1806 (819)  | 2306 (1046)           | 2496 (1132)                   |
| Ship Weight lbs (kg) ..... | 1956 (887)  | 2456 (1114)           | 2646 (1200)                   |

# SENTINEL III & IV® DIGITAL MICROPROCESSOR CONTROLLERS



### SENTINEL III®\*

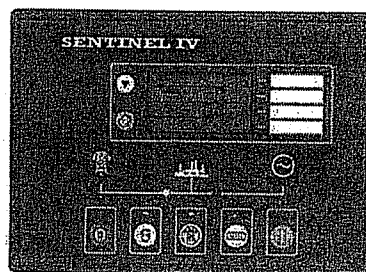
A field programmable microprocessor controller as standard equipment on all 4-pole gen-sets. This solid-state module automatically starts and stops the engine, indicates operational status and

fault conditions, by means of a graphical LCD display and flashing LED. This controller provides: Generator Volts (L1-N, L2-N, L3-N) and (L1-L2, L2-L3, L3-L1) • Generator Amps (L1, L2, L3) • Generator Frequency (HZ) • Engine Speed (RPM) • Engine Oil Pressure (PSI or BAR) • Engine Temperature (C and F) • Starting Battery Volts • Engine Run Time (Hours) • Scroll Button • Push Buttons for Manual On – Manual Off – Manual Operation – Auto Operation – Programming. These displays are supplemented further by LCD icon displays for various engine alarms. \*New for the fall of 2003.

Multiple alarm channels are provided to monitor the following: Under and Over Speed • Charge Alternator Failure • Emergency Stop • Low Oil Pressure • High Engine Temperature • Fail to Start • Fail to Come to Rest • Loss of Speed Sensing Signal. All alarms are indicated by an LCD icon and LED light.

### CONTROLLER FEATURES

- Microprocessor Based Design
- Programmable Operations
- Auto Engine Starting and Stopping
- Custom Graphical Icon Display
- Provides Engine and Generator Instrumentation
- Provides Engine Alarms and Status Information
- Configurable Inputs, Outputs, Alarms, and Timers
- LED and LCD alarm Indications
- Compatible with SENTINEL IV for easy upgrade



### SENTINEL IV®

This is an upgrade to SENTINEL III, having the same features, plus the following: Monitors utility power supply • Remote communication via optional RS232 port (RS485 porting available

– consult factory) • This module can also signal cell phones using GSM SMS message system, to report faults • Use this controller in conjunction with remote annunciators (see optional part # S-19)

# STANDARD AND OPTIONAL FEATURES FOR MODEL SP-600

## STANDARD FEATURES

### CONTROL PANEL:

- SENTINEL III® programmable microprocessor with logic and digital LCD display features:
  - AC volts, amps, frequency, oil pressure, engine temperature, DC volts, engine run hours, and additional display symbols for a wide variety of protective shutdowns.
  - Automatic shutdowns include: under and over speed, under and over volts, high engine temperature, low oil pressure, and engine over-crank.

### GENERATOR:

- AC generator • shunt excited • brushless design • single bearing • direct connection to engine with flex disc • class H, 180°C insulation • self ventilated • drip proof construction

### VOLTAGE REGULATOR:

- ½% Voltage regulation • EMI filter • under-speed protection • over-excitation protection • total encapsulation

### ELECTRICAL:

- Battery tray • battery cables • battery hold down straps

### SUPPORT:

- Operation, maintenance, and installation literature. Call 1-800-777-9639 or Fax 1-574-262-1840
- E-mail : [engineering@gillettegenerators.com](mailto:engineering@gillettegenerators.com)
- Web : [www.gillettegenerators.com](http://www.gillettegenerators.com)

### ENGINE:

- Full flow oil filter • air filter • oil pump • solenoid type starter motor • hi-temp radiator • jacket water pump
- thermostat • pusher fan and guard • exhaust manifold
- silencer • 12 VDC battery charging alternator • flexible exhaust connector • "Isochronous" duty, electronic governor • secondary dry fuel regulator • dry fuel lock-off solenoid • vibration isolators • closed coolant recovery system with 50/50 water to anti-freeze mixture

## ACCESSORY ITEMS

- Engine Coolant Heater with automatic 60°F on, 80°F off, thermostat
- Starting Battery Heater Blanket with automatic 60°F on, 80°F off, thermostat
- Starting Battery (size BCI# 27f, 660 CCA, 12 VDC)
- Battery Charger, float type, 12 VDC at max. charge, with ammeter.
- Battery Charger, float type, 12 VDC at max. charge, with ammeter and voltmeter, meeting NFPA-110 requirements.
- Radiator for dirty environment
- Flexible Oil Drain hose with on-off valve
- Flexible Radiator Drain hose with on-off valve
- External Permanent Magnet Generator (PMG) for increased induction motor starting capacity.
- Exhaust Silencer (Residential Grade) installed inside or outside (underline one) weather housing. Note: This muffler style (mounted outside housing) is standard equipment on Super-Silent housings.
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- Circuit Breaker with NEMA-3R Enclosure. Note: These breakers are shipped loose for installation in remote outside area by others.
- Single or Three Phase Windings, 50 or 60 Hertz.
- SENTINEL IV Controller with all features of Sentinel III, plus allowing full telemetry remote control annunciation, and utility power monitoring.
- Remote annunciator for up to (10) reporting functions. An additional relay expansion module, plus a second annunciator adds another (10) reporting functions. Note: SENTINEL IV must be selected, to achieve remote annunciation.
- All aluminum weather and sound deadening housing for coastal areas. (allow 8-10 weeks for special order)

