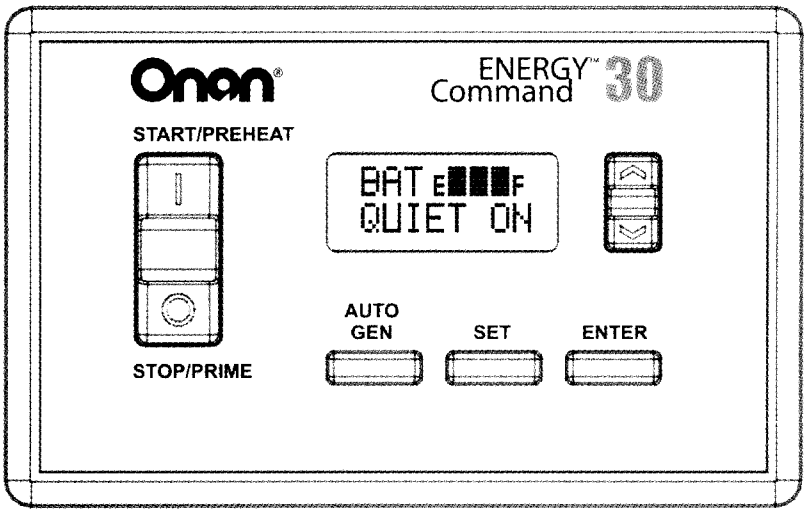
Operation and Installation Manual

Energy Command 30



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Operation and Installation Manual

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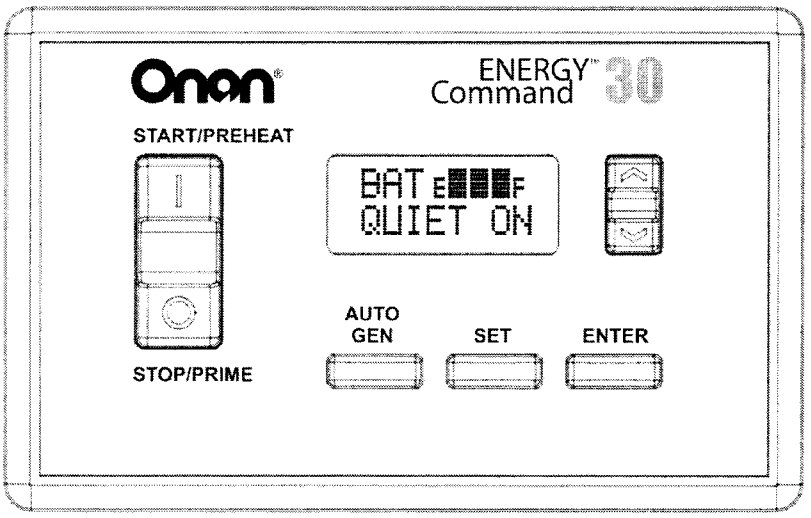


General

The Energy Command 30 (EC-30) is an Automatic Generator Starting (AGS) System that provides both automatic and manual control of Onan Diesel, Gasoline, and Liquid Propane (LP) engine driven AC generators (referred to in this manual as a genset). EC-30 also provides critical system information such as the battery state-of-charge, key operational information such as quiet time, genset service and fault messages. EC-30 automatically starts the genset when the battery becomes discharged or when there is a run request from an external device such as a Heating Ventilating and Air Conditioning (HVAC) system. When the battery is charged, or the HVAC system no longer requires power, the genset is automatically turned off.

This system is only for use with Onan Recreational Vehicle genset (Quiet Diesel gensets, and Gasoline/LP gensets).

For personal safety and to avoid equipment damage;

- Thoroughly read and understand this Operation and Installation Manual before using or installing.
- The EC-30 should be installed by qualified persons following wiring and installation details provided in this Operation and Installation Manual
- If these instructions conflict with the genset manuals, the genset manuals should take precedence.
- Keep these instructions with the genset manuals.

AGS Safety Precautions

Exposure to carbon monoxide, moving parts, and electricity hazards is possible due to unexpected automatic starting.

!!WARNING!!

CARBON MONOXIDE is deadly! MOVING PARTS and ELECTRICITY can cause severe personal injury or death. To reduce exposure to these hazards, always disable AGS before:

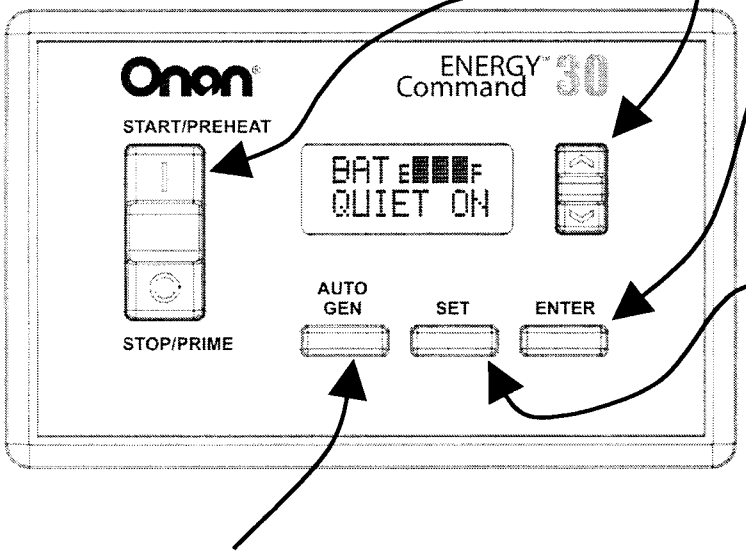
- ***Sleeping in vehicle, unless vehicle has a working CARBON MONOXIDE detector***
- ***Parking vehicle in garage or confined space***
- ***Parking vehicle for storage***
- ***Servicing genset***
- ***Servicing batteries***
- ***Servicing electrical appliances***
- ***Fueling vehicle.***

Before storing or servicing, disable AGS by disconnecting battery or genset remote harness.

OPERATION PANEL QUICK REFERENCE

START/STOP: Works exactly like the genset switch. If the genset switch has a run light and flashes diagnostics, the EC-30 run light will also be on when the genset is running, flash during preheat, and flash genset fault messages.

UP/DOWN: This key is used to scroll through display choices and change values that can be SET.



ENTER: This key is used to store values that have been changed, and to respond to display commands.

SET: This key is used to display and change settable values, such as: Local Time, Quiet Time Start and End (QT Start and QT End).

AUTO GEN: This key selects genset operating Mode:

MANUAL - Operator start/stop. No automatic.
AUTO ON - Automatic start/stop available.
QUIET ON - Automatic start/stop not available during quiet time,

Note: AUTO ON requires two keystrokes. First press **AUTO GEN** when in MANUAL mode;

ENTER for auto

...is displayed. Next press **ENTER** for AUTO ON mode.

Do not select AUTO ON mode before reading and understanding this Instruction Sheet and without following its Safety Precautions!

Note: When operating Mode is not being displayed, pressing the AUTO GEN key will take the display to its default: Local Time and Generator Mode.

Operation of the Energy Command 30

Overview

This section describes how to use the Energy Command 30 (EC-30). The Quick Start page defines key locations and Figures 1, 2, and 3 are the display screen flow charts.

Manual Genset Operation

STOP/START Switch

The Energy Command 30 (EC-30) START/STOP switch is used to manually start and stop the genset. This switch functions exactly like the stop/start switch located on the genset. **When any genset or remote start/stop switch is operated the EC-30 genset operating Mode is changed to MANUAL.**

The EC-30 START/STOP switch has a red backlight to indicate the genset is running. If the genset is equipped with diagnostics the EC-30 will also flash fault messages. It will also decode the flashing fault message and display a text fault message.

The genset may be started using the START/STOP switch even if there is no power to the EC-30. Once the genset is running the EC-30 display will turn on.

Default Display

Local Time and genset operating Mode is the default display. The genset operating Mode is shown on the bottom line. If genset Mode is not shown, the EC-30 returns to the default display after 10 minutes. To save power, the backlight is also dimmed after 10 minutes. Touch any key to turn the backlight on.

Using the Keys

UP/DOWN Key

UP/DOWN key is used to navigate through the display menu and to change values or parameters that can be set by the user. If the UP/DOWN key is held the display will scroll through the menu.

SET Key

SET is used to select values that can be changed by the user. Examples include: Local Time, start of Quiet Time, and end of Quiet Time. Pressing the SET Key will cause the value to flash (if it can be changed). The UP/DOWN key is used to change the value. Press ENTER to store the new value. Also see Setting Local Time.

ENTER Key

ENTER is used to store a value that has been changed. It is also used to ENTER the SETUP & INFO DISPLAYS. The ENTER key may also be required to exit a screen or to acknowledge an action.

Automatic Genset Operation

Safety Features

The EC-30 has safety features to help prevent automatic operation when it may be unsafe. Each time the vehicle is moved, the genset operating mode is changed to Manual. Only if the vehicle is in a safe location, then use the AUTO GEN key to select AGS AUTO ON mode.

!WARNING!
DO NOT RUN THE GENSET OR USE THE EC-30 AUTO ON OR QUIET ON MODES WHEN THE RV IS INDOORS OR IN A CONFINED SPACE. ASPHYXIATION OR CARBON MONOXIDE POISONING HAZARDS EXIST WHEREVER GENSET EXHAUST GASSES CAN ACCUMULATE.

This genset/control is not a life support system. It can stop without warning. Children, persons with physical or mental limitations, and pets could suffer personal injury or death. A personal attendant, redundant power or alarm system must be used if genset operation is critical.

The EC-30 safety feature requires an electrical safety signal input. Check with RV manufacture as to which safety signal is used. Three different types can be used:

- **Ignition**: Input is connected to the vehicle ignition system (motor homes or van conversions).
- **Brake**: Brake light for all trailer, 5th wheel, and pickup camper installations, or air brake on diesel motor homes.
- **Park**: The park signal/neutral (transmission) from motorized motor homes or van conversions.

When the safety input signal changes from off to on (or on to off), EC-30 stops the genset and changes the genset operating Mode to MANUAL. This prevents unexpected automatic starting indoors or in confined spaces. Verify the vehicle is in a safe location, and then use the AUTO GEN key to select AGS AUTO ON mode.

Note also that the EC-30 AUTO ON Mode requires a confirming keystroke (first AUTO GEN, then ENTER to confirm). This reduces risk of unintended AUTO ON operation.

RV's can use the AUTO ON or QUIET ON mode while traveling if the operator re-activates AUTO ON mode. However each time it is signaled by the safety input, the genset will be stopped and the Mode will change to MANUAL. If automatic operation is desired, press the AUTO GEN key after parking.

Safety Signal Verification

The EC-30 maintains a record of the last change of the Safety Input signal. If the EC-30 does not see the Safety Input change in 30 days, it will prompt the user to re-verify the Safety Input by activating the safety signal. (i.e. switching the ignition, changing transmission position, or operating the parking or trailer brake.)

If the Safety Input signal has not been turned on or off for 25 days the display will flash the "SAFETY OFF & ON" screen. Turn the Safety Input signal off and on, or on and off, to reset the 30 day timer. If the Safety Input is not verified by day 30 AUTO GEN is disable. The next time AUTO GEN key is pressed, the user is prompted to verify Safety Input signal.

Verify the Safety Input

The safety input must be verified before automatic operation is allowed. The first time the AUTO GEN key is pressed (after power is applied) the EC-30 requests:

SAFETY OFF & ON

Where SAFETY = IGNITION, PARK, or BRAKE. Turn on or off the appropriate signal:

- **Ignition**: Input is connected to the vehicle ignition system (motor homes or van conversions).
- **Brake**: Brake light for all trailer, 5th wheel, and pickup camper installations, or air brake on diesel motor homes.
- **Park**: The park signal/neutral (transmission) from motorized motor homes or van conversions.

If the safety input is functional, the display will say:

ENTER for auto

Only press the ENTER key if the genset is in a safe location for automatic operation.

AUTO GEN Key

AUTO GEN is used to select the MANUAL, AUTO ON, or QUIET ON genset operating Mode. If the Mode is not displayed, pressing AUTO GEN immediately exits to Local Time and genset Mode.

In MANUAL the genset may only be operated by using a START/STOP switch.

In AUTO ON the genset will start based on HVAC run requests and low battery regardless of time of day.

In QUIET ON Mode the genset will not automatically start during Quiet Time. Prior to Quiet Time the battery state-of-charge is checked, and if needed, the genset is started to charge the batteries before Quiet Time begins.

Note: Use of the automatic modes is not allowed if the house battery voltage is below 9 volts.

Setting Local Time

To set the local time simply press the SET key and use the UP/DOWN key to change the time. Note that the display flashes and the hour digit is underlined. Set the hour value, wait about four seconds for the underline to move to the right, set the tens digit, and then wait again to set the minutes digit, press ENTER.

Setting Quiet Time (QT) Start & End

The Local Time is used to prohibit automatically starting the genset during Quiet Time. The QUIET ON mode prohibits the genset from automatically starting between the start and end of Quiet Time. To change these times use the UP/DOWN key to navigate to the QT START or QT END display. The current setting is shown. Press SET to change the setting. Use the UP/DOWN key to change the value and press ENTER to store the new time.

Adaptive Cycle Management

The automatic modes have unique features to minimize repeatedly starting and stopping the genset, also called short cycling, and to pre-fill the battery prior to the start of Quiet Time.

Limiting Short Cycling

Onan genets have a minimum run time of 10 minutes. When in the automatic modes, the EC-30 observes the minimum run time, even if the automatic run request has been satisfied. For example; suppose the HVAC only needs to run for 6 minutes to cool the coach. The genset will still continue to run for a minimum of 10 minutes before stopping.

If a new run request is detected, during the minimum run, the Adaptive Cycle Management feature will limit short cycling by extending the run time as required

The EC-30 also compares the amount of HVAC on time to the HVAC off time. Based on this ratio, or percentage, it will continue to run in order to avoid short cycling. The EC-30 will turn off the genset after 10 minutes with no run request.

Quiet Time Pre-Fill

Two hours prior to the beginning of Quiet Time the EC-30 checks the battery level, and if the batteries are not full, the EC-30 will start the genset to charge the batteries.

Preventing Automatic Starting When Connected to Shore AC

The EC-30 has an input to prevent the genset from automatically starting when connected to shore power. For this feature to be active the installation must include a sensor to detect the presence of shore power. The Installation section of this Operation and Installation Manual describes how this feature is installed.

Note: This is an optional feature, See Testing the System to determine if this feature is installed.

Using the Displays

The top line of the display is used to show key system information and the second line of the display typically shows the genset operating Mode. Some displays require both lines. If the genset operating mode is not displayed, the EC-30 returns to the default display after 10 minutes. See Figure #1 Main Display Map.

House Battery Charge Level Indicator

The house battery charge level indicator uses both short and long term voltage trends to determine the battery level. It is intended as a guide to the state-of-charge (SOC) of the battery and its ability to sustain the load. When the EC-30 is in the automatic modes it also serves as the default trigger points for starting and stopping the genset to charge a low battery. The genset is started when the bar graph only shows one segment and stopped when three bars are displayed.

House Battery Voltage

The house battery voltage can be used to assess the performance of the charging system and to estimate the battery SOC. To estimate battery SOC, no loads should be on and the battery should not be charging. Ideally, the battery will have "rested" in this state for 24 hours. Letting the battery rest for 30 minutes will give an idea but the SOC estimate will be less accurate.

Open Circuit Voltage vs. State-of-Charge
12 Volt Batteries of Various Types

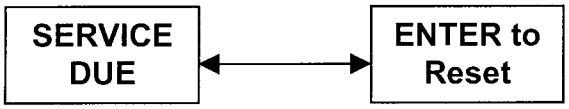
State of Charge	Battery Electrolyte Type		
	Liquid	AGM	Gelled
100%	12.6	12.9	12.8
75%	12.4	12.7	12.6
50%	12.2	12.4	12.3
25%	12.0	12.0	12.0
0%	11.8	11.8	11.8

Engine (Chassis) Battery

If a separate engine battery is wired to the EC-30 it is shown in the ENGINE Bat V display. There is no display if this feature is not wired. This is an optional feature.

SERVICE IN Display

The SERVICE IN display is a countdown service hour meter that indicates the genset next required service interval. To determine specific service items see the genset manual. When the service interval has elapsed the display alternates as shown below.



Display Alternates
Press ENTER to Reset
Service Hour-Meter

The SERVICE DUE message is displayed as soon as the service interval has elapsed. The UP/DOWN key still allows navigation through the main displays and all functions still work. After the genset is serviced navigate to the SERVICE DUE message and ENTER to reset the service interval hour-meter.

If the genset is serviced prior to the next service reminder, go to the SERVICE IN display and press SET, press ENTER to reset the service interval hour-meter.

The SERVICE IN display is also used to display genset faults and errors that may occur. If a fault or error has occurred, it will be displayed even if it no longer exists. When any key is pressed the message will be cleared.

The last fault message may be displayed by pressing the STOP switch three times. See the genset operating manual for details on the error codes and messages.

Genset Hour-meter

The genset hour meter displays the total elapsed time the genset has run since the EC-30 was installed. If the EC-30 is installed on an existing generator, see the SETUP section of this manual.

Setting Up and Testing the Energy Command 30

Overview

This section describes how to Setup and Test the EC-30. Before using the EC-30 for the first time check to be sure that the unit is setup appropriately for the system. The character < is used to indicate all default values. Also see Figures #1-4.

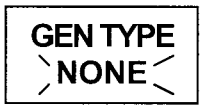
Setting GEN TYPE and Safety Type Is Required for Automatic Operation

The very first time the EC-30 is turned on (power applied) an initial setup procedure begins. The EC-30 requires setup of both the GEN TYPE and Safe Type prior to allowing automatic operation.

The genset type also sets the Service Interval for service messages and critical automatic starting parameters. The first service interval is 50 hours for all models. See SETUP GENSET to change the genset type after first power up.

Setting GEN TYPE

First enter the correct GEN TYPE. If no GEN TYPE has been selected and the AUTO GEN switch is pressed, the display will say:



GEN TYPES TABLE 1

GEN TYPE	MODEL	Service In
NONE<	---	---
QD 10/12	Quiet Diesel	250 hours
QD 7.5/8	Quiet Diesel	150 hours
QD 5.5	Quiet Diesel	150 hours
GAS/LP	Marquis, Microlite, Micro Quiet,	150 hours
GAS RV	Camp Power	150 hours

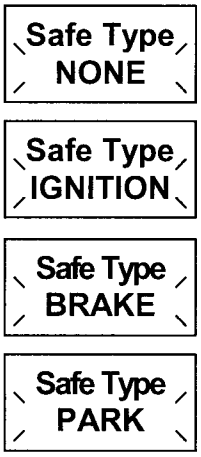
The word NONE will be flashing. Use the UP/DOWN key and the table above to select the correct genset type. Press ENTER when the correct genset is displayed. The next display will say:

Setting Safety Type

The Safety Input is described in detail in the Installation section of this manual. The Safety Input must be supplied from:

- **Ignition**: Input is connected to the vehicle ignition system (motor homes or van conversions).
- **Brake**: Brake light for all trailer, 5th wheel and pickup camper installations, or air brake on diesel motor homes.
- **Park**: The park signal/neutral (transmission) from motorized motor homes or van conversions.

The displays for the choices are:



Use the UP/DOWN switch to select the correct safety type. Press ENTER when correct type is displayed.

If setup of the SafeType is skipped, pressing the AUTO GEN key will begin this procedure.

SETUP & INFO Displays

The SETUP & INFO displays are used to tailor the EC-30 to the particular system and application. Refer to Figure #1 for the various main displays that are available. To access the SETUP & INFO displays use the UP/DOWN key to navigate to the SETUP & INFO display and press ENTER. (See Figure #2: Setup & Info Displays) The UP/DOWN key now allows scrolling through the various choices. To access a choice press the ENTER key. Again the UP/DOWN key is used to navigate through the available displays. Use the ENTER To Exit display to continue through the previous displays or:

Press the AUTO GEN key anytime to return to the default display.

SYSTEM INFO Display

The SYSTEM INFO display allows access to key information. Pressing ENTER once will display the reason for the last automatic action. Typical displays are shown below:

Display	Description
AUTO RUN HVAC	Genset started for HVAC run request.
AUTO STOP HVAC	Genset stopped, HVAC run request satisfied.
AUTO STOP SAFETY	Genset stopped safety input sensed. SAFETY=IGNITION, BRAKE, or PARK
AUTO STOP QT START	Genset stopped at start of Quiet Time.
AUTO STOP SHORE ON	Genset stopped, shore power present.
AUTO STOP FULL BAT	Genset stopped, battery full.
AUTO RUN LOW BAT	Genset started because battery was low.
AUTO STOP NO SAFETY	Genset stopped no safety input sensed for 30 days.

VERSION Display

The VERSION display shows the version control number for EC-30. Should it be necessary to contact customer service this number will help determine the specific configuration of your EC-30.

SETUP GENSET Displays

The SETUP GENSET displays are used to select the type of genset used with the EC-30 and to adjust the genset hour meter.

SETUP GENSET Display

To change the GEN TYPE after initially setting navigate to the SETUP & INFO display and press ENTER. Now navigate to the SETUP GENSET display and press ENTER. The GEN TYPE will be displayed. Press SET, the display will flash. Use the UP/DOWN key to select the GEN TYPE and press ENTER when the appropriate type is displayed. The GEN TYPE is stored in permanent memory and will not have to be changed unless the EC-30 is installed on a different type genset.

SET Gen Hour Display

If the EC-30 is installed on an existing genset check the hour-meter on the genset and record the reading. ENTER the SETUP & INFO menu and navigate to the SETUP GENSET display. Press ENTER and use the DOWN key to select the SET Gen hour's display. Press SET. The next display says, ENTER to unlock. This prevents unauthorized changes to the hour-meter. Press ENTER to continue.

The display will flash. Hold down the UP/DOWN key and scroll until the left most digit matches the desired value. Release the UP/DOWN key and wait four seconds for the underline to move to the next digit to the right and scroll to its desired value. Set each successive digit to the right until the correct genset hours are displayed press ENTER. The value is stored in permanent memory and will not have to be changed unless the EC-30 is installed on a different genset. The hour-meter in the EC-30 and the hour meter at the genset may differ slightly over time due to small differences in accuracy.

SETUP AUTO Displays

The SETUP AUTO displays may be used to change the automatic starting parameters. AUTO< is the default value. The symbol < indicates the factory default value.

SafeType Display

The SafeType display allows the selection of the type of safety input that is used to prevent automatic operation. It should be setup the very first time the unit is turned on as described earlier. If it has not been setup (SafeType NONE), automatic operation will not be allowed. If the AUTO GEN key is pressed, the display below will appear:

Use the UP/DOWN key to select the correct type of safety input:

- **Ignition**: Input is connected to the vehicle ignition system (motor homes or van conversions).

- **Brake**: Brake light for all trailer, 5th wheel, and pickup camper installations, or air brake on diesel motor homes.
- **Park**: The park signal/neutral (transmission) from motorized motor homes or van conversions.

Press ENTER to store in permanent memory. This will not have to be changed unless the type of safety input is changed or the EC-30 is installed in a different application.

Setting START/STOP @ Values - General

When AUTO< is selected Quiet Time prefill (charging the battery two hours prior to the beginning of Quiet Time) occurs if the battery level is less than FULL (all three bars of the level gauge are on).

Care should be taken changing the settings. It is recommended that these setting only be changed by qualified personnel that understand the charging system and have checked its operating voltages.

If STOP @ V has been changed to a user defined value, then pre-fill occurs whenever the battery voltage is less than the STOP @ V voltage setting. When the battery is full or reaches the user set STOP @ V the genset will be stopped.

START @ V

The START @ V is the voltage to which the house battery must fall to cause the genset to automatically start due to a low battery. The default value is Auto which starts the genset when one bar is displayed in the battery level indicator. See the Operation section of this manual. The START @ V voltage range is 10.5-12.5 volts. A lower voltage will decrease the number of starts due to a low battery. A higher voltage will increase the number of start due to a low battery. Setting the START @ V too high may result in frequent "false" starts due to a "low battery" start.

Time @ START V

The Time @ START V is the length of time that the house battery voltage must be below the START @ V voltage before the genset will automatically start. The default value is 15 seconds. The range is 5-60 seconds. Setting a shorter time will increase the number of generator starts due to temporary voltage dips, (increase the "sensitivity" to voltage dips). Setting a longer time will decrease the "sensitivity" to temporary voltage dips.

STOP @ V

The STOP @ V is the voltage to which the house battery must rise to cause the genset to automatically stop due to a full battery. The default value is Auto which stops the genset when three bars are displayed in the battery level indicator. See the Operation section of this manual. The STOP @ V voltage range is 13.2-14.5 volts. A lower voltage will not fill the battery as full but it will reduce the amount of time the genset will run. A higher voltage will fill the battery to a higher state of charge, but increase the amount of genset run time. If the charge system is unable to reach the STOP @ V voltage, the result will be excessive genset running. **This setting does not change the battery charging voltage. Do not set STOP @ V above the voltage of the battery charger.**

Time @ STOP V

The Time @ STOP V is the length of time that the house battery voltage must be above the Stop @ V voltage to cause the genset to automatically stop due to a full battery. The default value is one minute. The range is 1-60 minutes. Setting a shorter time will decrease the genset run time. Setting a longer time will increase the length of time the genset runs to charge the battery.

Selecting Appropriate Values

The selection of the start and stop voltages and the time required to be at those voltages requires trade-offs. It is a balance between the number of genset starts, the length of genset run time, and the desired battery charge level. The default values have been selected to ensure that the battery stays charged and the genset does not run excessively or needlessly start for temporary voltage excursions. We recommend the default values be used until the performance of the system can be assessed.

Setting the START @ V higher will result in more genset starts and a quicker response to voltage dips. Setting the Time @ START V shorter will also increase the response to voltage dips. Both will cause more genset starts.

Setting the STOP @ Voltage higher will result in more genset starts and shorter genset runtimes for battery charging. Setting the Time @ STOP V longer will increase the genset runtime for battery charging. Remember charging current falls to very low levels at the end of charge. Typically it is preferred to use shore power and not the genset to "top off" or fully charge the battery. Avoid running lightly loaded gensets. Run the system through a complete automatic start/stop cycle after changing setting to confirm proper performance.

Effect of Increasing START @ V OR Time @ START V

Effect of Increasing	# Starts	Runtime	Battery Level
START @ V	More	Less	Higher
Time @ START V	Less	More	Higher
STOP @ V	More	Less	Higher
Time @ STOP V	Less	More	Higher

TEST SYSTEM Displays

The TEST SYSTEM displays (see Figure #3 TEST SYSTEM Displays) are used by the installer to verify all input are connected and operate, and to test run the genset. After installation the TEST SYSTEM displays can be used to verify correct operation or to assist in troubleshooting the system. The various test displays request a specific action from the operator and acknowledges that the action has been correctly observed.

To ensure an orderly process be sure the GENSET MODE is MANUAL and all inputs are in the off state before beginning the test. Meaning there are no HVAC run requests, the ignition is off, the park brake (or brake lights for a trailer) is off, and there is no shore power connected.

SAFETY TEST Display

The SAFETY TEST display is used to verify the safety input is operating correctly. The safety input may be connected to the:

- **Ignition**: Input is connected to the vehicle ignition system (motor homes or van conversions).
- **Brake**: Brake light for all trailer, 5th wheel, and pickup camper installations, or air brake on diesel motor homes.
- **Park**: The park signal/neutral (transmission) from motorized motor homes or van conversions.

The safety type that is set is displayed.

To check proper operation, navigate to the SETUP & INFO and press ENTER. Now go to the TEST SYSTEM display and press ENTER again. SAFETY TEST will be the first display, press ENTER. The display will either say IGNITION, or BRAKE, or PARK, ON & OFF. After the EC-30 sees the change of state of the safety input it will display the safety type and ok ENTER. Pressing ENTER will acknowledge its correct operation and exit back to the SAFETY TEST display.

HVAC (RUN REQUEST) Display

The HVAC RUN REQUEST system is tested by sequentially turning on and off each input. There may be up to three inputs. From the TEST SYSTEM display, press ENTER and then navigate to HVAC RUN REQUEST. Press ENTER. The first display will say TURN ON HVAC1. It makes no difference which HVAC system is connected to which terminal. Simply turn on one, and leave all others off. If the EC-30 detects the input, the display will change to say HVAC1 OK Turn Off. Now turn off the HVAC. The displays will now ask that HVAC2 be turned on. Turn on the next HVAC unit and follow the displayed instructions. This process allows a quick test of all HVAC RUN REQUEST inputs. If there is only one or two HVAC inputs, use the UP/DOWN key to go to the last display which is ENTER to Exit.

Run Gen Display

Before testing the genset be sure that the location is safe for running the genset and that its installation is completed. This test verifies that the start, stop, and switched B+ signals between the EC-30 and the genset are ok. Navigate to the display that says ENTER to Run Gen. Pressing ENTER will begin a start and stop sequence which can only be interrupted by manually stopping the genset using the STOP switch. The EC-30 will go through a complete start and stop sequence and it will display its results as the test is happening. When the test is complete the display will say Gen Ok ENTER. Pressing ENTER will exit back to the display that says ENTER to Run Gen. To continue testing other system components use the UP/DOWN key for the next display.

Testing Shore AC Present

This test verifies that the EC-30 can sense when AC power is available from the utility grid. Before starting this test be sure that the Shore AC is disconnected. Turn off the AC breaker at its supply or unplug the vehicle or trailer from the AC grid system. Do not do this test with the genset running. Navigate to the Shore AC Present display and press ENTER. The display will say Turn On Shore AC. Now plug the shore AC back in or turn the breaker on. The display will change to read AC Ok ENTER. Press ENTER to exit the test.

Exiting TEST SYSTEM

To exit TEST SYSTEM use the UP/DOWN key until ENTER to EXIT is displayed. Press ENTER and press DOWN once and ENTER to Exit will be displayed. Pressing ENTER will exit to the Main Display.

Installing the Energy Command 30

Overview

This section describes how to install the Energy Command 30 (EC-30).

General

This system is only for use with Onan Recreational Vehicle genset (Quiet Diesel gensets, and Gasoline/LP gensets).

The control circuitry is a 3-wire ground to start/stop type. Before installing, refer to the System Diagram, Figure 4, and select the appropriate wiring diagram, Figures 5-7, for connection to your genset. Consult an Onan distributor with any questions.

Appendix A shows the Onan gensets that are compatible with the EC-30 and the correct wiring figures and harnesses to use for each genset.

!CAUTION! For personal safety and prevention of equipment damage, only experienced personnel should install this system. The installer must wear safety glasses and protective clothing necessary for personal safety.

Installation Precautions

CAUTION! Always disconnect a battery charger from its AC source before disconnecting the battery cables. Otherwise, disconnecting the cables can result in voltage spikes high enough to damage the DC control circuits of the genset.

! WARNING! Unexpected starting of the genset set while working on it can cause severe personal injury or death. Prevent unexpected or accidental starting by disconnecting the genset battery cables {negative (-) first}, or by disconnecting the remote harness at the genset.

!WARNING! Arcing can ignite explosive hydrogen gas given off by batteries, causing severe personal injury. Arcing can occur if the negative (-) battery cable is connected and a tool being used to connect or disconnect the positive (+) battery cable accidentally touches the frame or other grounded metal part of the genset set or vehicle frame. To prevent arcing always remove the negative (-) cable first, and reconnect it last.

Specifications

Operating Temperature:	-20 to 70 degrees C (-4F to 158F)
Storage Temperature:	-40 to 70 degrees C (-40F to 158F)
Battery System:	12 Volt DC
Voltage Range:	8 – 35VDC
Typical Current Draw:	47mA @ 12V
L x W x D:	80.98 x 130.12 x 30.48 mm (3.188 x 5.125 x 1.20 inches)

INSTALLATION CODES AND STANDARDS FOR SAFETY

The vehicle builder or EC-30 installer bears sole responsibility for the appropriate selection of components, for proper installation and for obtaining approvals from any authorities having jurisdiction for the installation. EC-30 is suitable for installation in accordance with:

- ANSI A 1192 (NFPA No. 1192)-Standard on Recreational Vehicles
- NFPA No.70, Article 551-Recreational Vehicles and RV Parks
- CAN/CSA-Z240.6.2 Recreational Vehicles

Federal, State and local codes, such as the California Administrative Code - Title 25 (RV installation), might also be applicable. Installation codes and recommendations may change over time and vary between countries, states and municipalities. It is recommended that the standards in Table 2 be obtained for reference.

TABLE 2 REFERENCE CODES AND STANDARDS

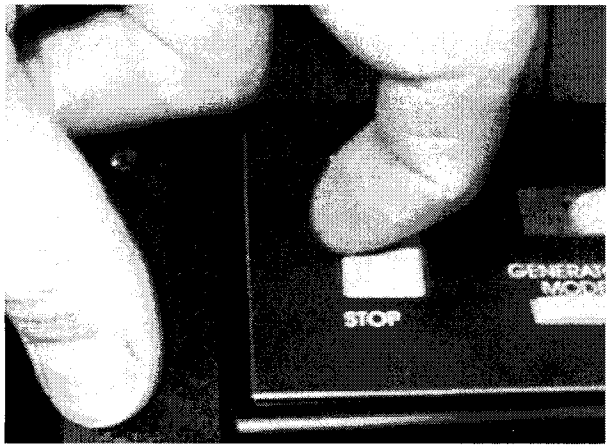
<NA for control systems>	
NFPA 70 National Electric Code	National Fire Protection Association 470 Atlantic Avenue Boston, MA 02210
ANSI A119.2 (NFPA 1192) Standard on Recreational Vehicles	Recreational Vehicle Industry Association 14650 Lee Road Chantilly, VA 22021
California Administrative Code Title25, Chapter 3	State of California Documents Section P.O. Box 1015 North Highlands, CA 95660
CAN/CSA-Z240.6.2 Recreational Vehicles	Canadian Standards Association Housing and Construction Materials Section I178 Rexdale Blvd Rexdale, Ontario, Canada M9W 1 R3

OEM Supplied Equipment

Required for Installation	Manufacturer & PN
Mating Connector Housing	Tyco/AMP 770583-1
Pins (Up to 16 required)	Tyco/AMP 171637-1
2 or 3 5A DC Inline Fuses	Installers choice
Tools	
Pro-Crimper II W/Die 16-20	Tyco/AMP 189727-1
Contact Extraction Tool	Tyco/AMP 90760-1

Removing Magnetic Overlay

Insert fingernail beside the Stop/Start Switch and lift gently to remove magnetic overlay.



Installation Procedure

This procedure describes the physical installation of the unit.

Preparing to Mount the EC-30

1) Select a location:
   a. Use the Mounting Template and the EC-30 itself to determine an appropriate location. It should be located in a visible location where it can be easily operated.
   b. **CAUTION!** Check the backside (inside) of the chosen location to verify that nothing will interfere with drilling and cutting the opening for the remote, or with the fasteners, harness plug, or enclosure on the back of the EC-30.
   c. Determine the feasibility of routing the control wires from the genset to the remote. Verify that the route of the control wires meets all applicable national and local codes. Wires must be protected from all hot, sharp, and abrasive surfaces.
2) Prepare the chosen location for the genset controller.
   a. Use scissors to cut out the template.
   b. Tape the template to the mounting surface to be cut out, make sure that the template is "square or level" with the mounting surface.
   c. Using a center punch and a hammer, punch a mark through the template for each fastener and at the perimeters of the cutout area.
   d. Remove the template.
3) Drill the cutout starter holes at the four corners of the cutout area. Cut between them and remove the cutout.

NOTE: Because the location of the genset controller will vary by installation, the tools to be used and the cutout material (wood, metal, plastic, etc.) will differ. Therefore, the size of the cutout starter holes and the procedure for cutting between the starter holes must be determined by the installer.

4) Drill 1/8-inch diameter holes for the control panel fastening screws.
5) This completes the preparation of the mounting hole for the control panel. **Do not mount until wiring is complete.**

Wiring Guidelines

The wiring for the EC-30 may be single conductors of 16-20 AWG wire formed into a wiring harness. The wire must be rated for the environment, temperature, and applicable standards.

Separation from sources of Electro-magnetic Interference (EMI): All cabling should be installed in such a way as to comply with the **minimum** separation of 5 inches (127 mm) from AC power sources.

Tension: All wires should be free from tension at both ends, as well as over the length of each run.

UTP cable bends: UTP cable bends or radii should be no less than eight times the cable diameter.

!CAUTION! Incorrect connections can damage genset controls, remote devices, and interconnect wiring. Make sure that the leads between the connections are properly connected.

Wiring Installation

1. Use wire tags or labels to label each end of every wire. Use Figures 5, 6, and 7 to determine the correct labels and connections.
2. At the controller end of the harness, insert the terminated and labeled wires into the correct positions in the connector body. Use Figures 5, 6, and 7 to determine the correct positions.
3. At the genset end of the harness, insert the terminated and labeled wires into the correct positions in the connector body. Use Figures 5, 6, and 7 to determine the correct positions.

Use tie wraps at not less than 20-inch intervals to keep the wire bundle neat. Use protective sheathing where necessary to protect the wires from sharp edges.

Genset Harness Installation

1. Route the harness from the genset to the control panel, making sure that the connectors on the harness match the corresponding connectors at each end. Wires must be protected from all hot, sharp, and abrasive surfaces.

!CAUTION! When DC wires are run with AC wires, electrical induction can occur and cause operational problems. Route the controller harness separately from AC load wires.

2. Seal any holes where the harness passes through bulkheads.

!WARNING! Exhaust gases are hazardous and my cause severe personal injury or death. Seal all holes to prevent the entrance of exhaust gasses into the vehicle interior.

Connections (Definitions)

This section describes each connection to the EC-30.

Genset Connections

WIRE #1 BATTERY GROUND (NEGATIVE): This wire supplies the ground or negative side of the circuit for the EC-30. It must be supplied from the genset.

WIRE #2 STOP OUTPUT: This wire supplies the stop signal to the genset. It is an active low or grounded output. It is controlled by the STOP/START switch and in the automatic mode by the EC-30.

Wire #3 START/PREHEAT: This wire supplies the start/preheat signal to the genset. It is controlled by the STOP/START switch and in the automatic mode by the EC-30.

Wire #4 Request HVAC Active Low: This input wire supplies a signal to the controller when the HVAC system requires the genset to run. Typically it is supplied from a thermostat or the HVAC system controller. Unlike the other 3 HVAC request inputs, see wires #10 - #12, this input is an active low or ground input. This means it requires a transition from +12V to ground to activate the auto-gen start function. In contrast to the other 3 HVAC inputs which require a transition from ground to +12V.

Wire #5 Switched B+ From Genset: This wire is switched to the battery positive voltage when the genset is running. It is used to provide a signal for the genset hour meter and to indicate the genset is running.

Wire #6 Genset Status Light: This wire supplies a diagnostic output from the genset that flashes the red light in the START/STOP switch to indicate a genset fault. The status light output is decoded by the EC-30 to display a text fault message.

Power and Voltage Connections

WIRE #7 8-35VDC Power +: This wire is the positive power supply to the EC-30. It may be supplied from the distribution side of the DC disconnect if it is desirable to have all DC loads off when the disconnect is off. It must be protected by a 5A inline fuse located as close to the battery or source as possible. **Do not install the fuse until the installation is complete. Install fuse just prior to testing the installation**.

WIRE #8 House Battery Sense 12-24VDC: This wire supplies the positive sense voltage to the unit which is displayed as the house battery voltage and is used to determine the house battery state-of-charge indicator. It must be connected directly to the battery. It must be protected by a 5A inline fuse located as close to the battery as possible. **Do not install the fuse until the installation is complete. Install fuse just prior to testing the installation.**

WIRE #9 Engine Battery Sense 12-24VDC: This wire supplies the positive sense voltage for the engine starting battery. This is an optional feature. The engine battery voltage will only be displayed if it is connected. It must be connected directly to the battery. It must be protected by a 5A inline fuse located as close to the battery as possible. **Do not install the fuse until the installation is complete. Install fuse just prior to testing the installation.**

Run Requests from HVAC Systems

There are three inputs for Run Requests from HVAC systems.

Wire #10 Run Request HVAC #1: This input wire must supply +12V to the controller when the HVAC system requires the genset to run. Typically it is supplied from a thermostat or the HVAC system controller.

Wire #11 Run Request HVAC #2: Used with a second HVAC unit. See above.

Wire #12 Run Request HVAC #3: Used with a third HVAC unit. See above.

Sensing AC Shore Power is Present

The two inputs described below are used to prevent the genset from automatically starting when AC Shore Power is present.

Do not connect 120VAC or 240VAC line voltage to the EC-30! It will be damaged and will not be covered by warranty.

Wire #13 AC Present - Ground: Wires #13 and #14 must be supplied by one of these options.

- UL Listed 120VAC to 12-16VAC transformer.
- UL Listed 120VAC to 12VDC plug-in power supply. - 12VDC ground side connects to wire #13. + 12VDC positive side connects to wire #14.

Note: AC transformer or 120VAC to 12DC converter is not supplied.

Wire #14 AC Present + Positive: This is the + positive input. See above.

SAFETY INPUTS

THE EC-30 REQUIRES A SAFETY INPUT TO PREVENT THE GENSET FROM UNEXPECTED AUTOMATIC STARTING AFTER THE VEHICLE HAS BEEN PARKED. THE SAFETY INPUT MAY BE SUPPLIED FROM DIFFERENT SOURCES DEPENDING ON THE APPLICATION:

VEHICLE TYPE	SAFETY INPUT
DIESEL COACH	-AIR PARK BRAKE SWITCH -IGNITION SWITCH
GASOLINE/LP/DIESEL -MOTOR HOMES -VAN CONVERSION	-TRANSMISSION PARK / NEUTRAL - IGNITION SWITCH
-TRAILER -5th WHEEL -PICKUP CAMPER	-TRAILER BRAKE LIGHT -CAMPER BRAKE LIGHT

NOTE:AUTOMATIC OPERATION IS NOT ALLOWED UNLESS THE SAFETY INPUT HAS BEEN VERIFIED.

During the Safety Input set up choose Ignition, Brake or Park. The following definitions apply:

- **Ignition**: Input is connected to the vehicle ignition system (motor homes or van conversions).
- **Brake**: Brake light for all trailer and 5th wheel installations, or air brake on diesel motor homes.
- **Park**: The park signal/neutral (transmission) from motorized motor homes or van conversions.

The Safety Input must change state when the vehicle is parked. This prevents automatic operation if the vehicle is parked in a garage or other enclosed space. For example the vehicle ignition switch changes state from on to off when vehicle is parked.

Safety Inputs

The two inputs described below are used to prevent the genset from automatically starting. The voltage across the input must change from 0VDC to 12VDC or from 12VDC to 0VDC when the vehicle is parked.

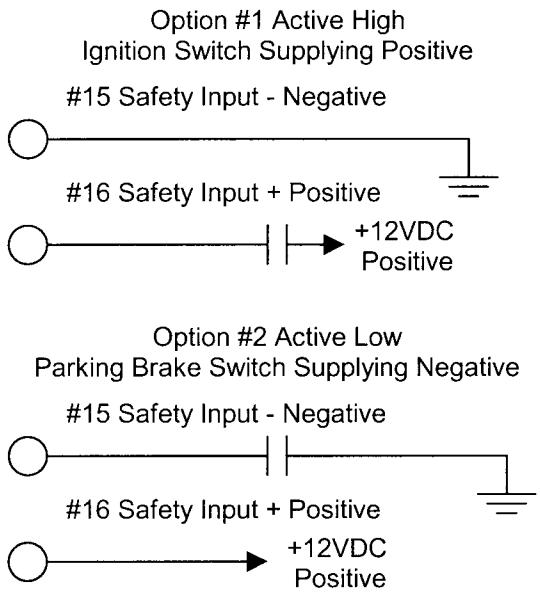
Wire#15 Safety Input – Negative: The negative input to the safety circuit. See Below.

Wire #16 Safety Input +12V: The positive input to the safety circuit. See Below.

This input should be treated like a relay coil input, or a light bulb. It must be supplied with both a positive and a negative. The actual safety switch (ignition, park brake, or transmission park switch) may be located in the positive or negative side of the circuit.

These inputs may be wired to be active (on) when supplied with a negative or positive input. If supplied with a positive input connect #15 to negative. If supplied with a negative input connect #16 to +12V. The drawing below shows how to wire these inputs for either a negative or positive input.

Wiring Options for Safety Inputs



Final Connections and Testing

This section describes the final connections and the test procedure to verify that the unit has been installed correctly and is operating properly.

1. Plug the genset end of the connector into the genset.
2. Pass the controller end of the harness through the cutout for the controller.
3. Plug the controller end of the harness into the controller.
4. Insert the controller in the cutout hole and secure it with the screws supplied with the controller. DO NOT OVER-TIGHTEN MOUNTING SCREWS, IT MAY DAMAGE OR DISTORT THE ENCLOSURE.
5. Install the magnetic overlay.

Test Procedure

The following test procedure describes a systematic method of testing both the installation and operation of the EC-30. It is highly recommended that the installer follow these steps:

1. Reconnect the genset negative (-) battery cable.
2. Insert the fuse in the fuse holders for: Wire #7 8-35VDC Power, Wire # 8 House Battery Sense, and Wire #9 Engine Battery Sense.
3. Refer to Setting Up section of this manual to select the genset type.
4. **Setting the Hour-Meter: If the EC-30 is installed on a new genset this step may be skipped.** See Setting Up section of this manual.
5. Start and stop the genset using the Stop/Start switch located at the genset. This confirms the genset operation.
6. Start the genset at the Automatic Genset Controller and check the following:
   a. The indicator light in the controller Start/Stop switch flashes while the genset engine is cranking. This verifies that the diagnostic wiring is correct. (Only for units with diagnostics.)
   b. Genset starts and continues to run.
   c. The indicator light in the Start/Stop switch remains illuminated when the genset is running.
   d. Use the Up/Down Switch to the right of the display to scroll to the Hour Meter display and confirm that it is operating.
   e. Use the Up/Down Switch to the right of the display to scroll to the Volt Meter display and confirm that it is operating.
7. Stop the genset at the controller and check the following:
   a. The genset stops
   b. The indicator light in the Start/Stop switch turns off.
   c. The Hour Meter stops.
8. Refer to Figure #3 and use the TEST SYSTEM Displays in the Setting Up section of this manual and follow the test procedure outlined there to sequentially test all inputs and outputs.
9. Set the clock to the current local time as described in the Setting Up section of this manual.

Troubleshooting

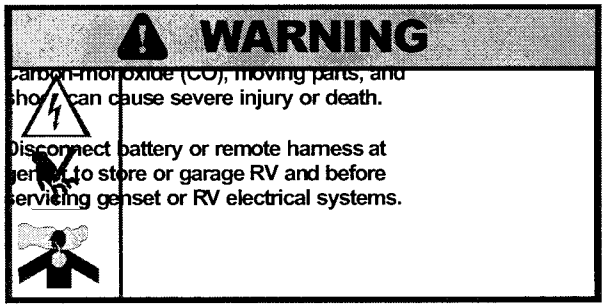
If controller functions do not operate properly, proceed as follows;.

1. Does the genset operate correctly from the genset controls? If it does not, the problem is in the genset, not the EC 30 controller. See the genset Operator, Installation, and Service Manuals. .
2. If the genset operates correctly from the genset controls, Confirm that the correct connection diagram (Figures 5, 6 and 7) was used, then check EC 30 wiring connections.
3. Confirm that the correct voltages are present on each terminal.
4. Check all terminal connections on both ends of the wiring harness. Are harness connectors properly joined?
5. Repeat the TEST SYSTEM procedure as described in this Operation and Installation Manual.

AGS Warning Labels

The unit includes a sheet of adhesive warning labels. Affix one label at or near each of the following locations:

- Genset Service Access Panel
- Genset Start/Stop Switch
- Vehicle AC Distribution Panel
- Vehicle AC Transfer Switch
- For towed RV, tow tongue or tongue jack



How to Obtain Customer Service

If you require service, parts, or product literature, contact the nearest Onan dealer or distributor. To locate the nearest authorized dealer or distributor, in the United States or Canada call 1-8OO-888-ONAN for name and telephone number (This automated service utilizes touch-tone phones only). By calling this number, you can also request a directory of authorized RV servicing dealers:

RV Sales and Service Directory F-919.

To get service, contact the authorized dealer or distributor nearest you. Explain the problem and make an appointment. If you have difficulty in arranging for service or resolving a problem, please contact the dealer coordinator or service manager at the nearest Onan dealer for assistance.

Before calling for service, have the following information available:

1. The complete model number and serial number.
2. Software version number, as shown in the SYSTEM INFO displays.
3. The date of purchase.
4. The nature of the problem.

To enjoy the benefits the product offers requires an understanding of this manual. If you have ideas for its improvement we happily accept editorial comments.

!WARNING! Improper service or replacement of parts can result in severe personal injury, death, and/or equipment damage. Service personnel must be trained and experienced to perform electrical and/or mechanical service.

Warranty Policy

The ONAN limited warranty covers your Energy Command 20/30 Control for the first three (3) years you own your EC 20/30 if purchased at the same time as an Onan generator. Energy Command 20/30 Controllers sold separately are covered for 90 days.

For complete Onan Limited Warranty details contact your Onan RV Service and Parts dealer or call 1-800-888-ONAN (1-800-888-6626).

Appendix A Onan Gensets for Use With the EC-20/30

QUIET DIESELS

MODEL	KW	PRODUCT	EC-20/30 GEN TYPE	Service IN Hours	Connection Figure	Onan IN Cable No.
HDCAx	10/12	Quiet Diesel	QD 10/12	250	5	044-00076
HDKCx	10/12	Quiet Diesel	QD 10/12	250	5	044-00076
HDKAx	7.5/8	Quiet Diesel	QD 7.5/8	150	5	044-00076
HDKBx	5.5	Quiet Diesel	QD 5.5	150	5	044-00076

GASOLINE/LIQUID PETROLEUM (LP) (with Status Light)

MODEL	KW	PRODUCT	EC-20/30 GEN TYPE	Service IN Hours	Connection Figure	Onan IN Cable No.
HGJAx	7.0	Marquis Platinum	GAS/LP	150	6	044-00075
HGJAx	5.5	Marquis Gold	GAS/LP	150	6	044-00075
KY	4.0/3.6	MicroQuiet	GAS/LP	150	6	044-00075
KYD	4.0/3.6	CampPower	GAS/LP	150	6	044-00075

GASOLINE/LIQUID PETROLEUM (LP) (without Status Light)

Note 1: This genset model does not support diagnostic fault codes.

MODEL	KW	PRODUCT	EC-20/30 GEN TYPE	Service IN Hours	Connection Figure	Onan IN Cable No.
KVD	2.8/2.5	CampPower (Note 1)	GAS/LP	150	7	044-00074
KV	2.8/2.5	MicroLite (Note 1)	GAS/LP	150	7	044-00074

- 25 foot cables available through Onan IN. Cables have mating connectors for EC20/30 and genset, flying leads for other connections.
- Also available is an 18" pigtail, part number 044-00077, without the genset connector that mates to the EC20/30.

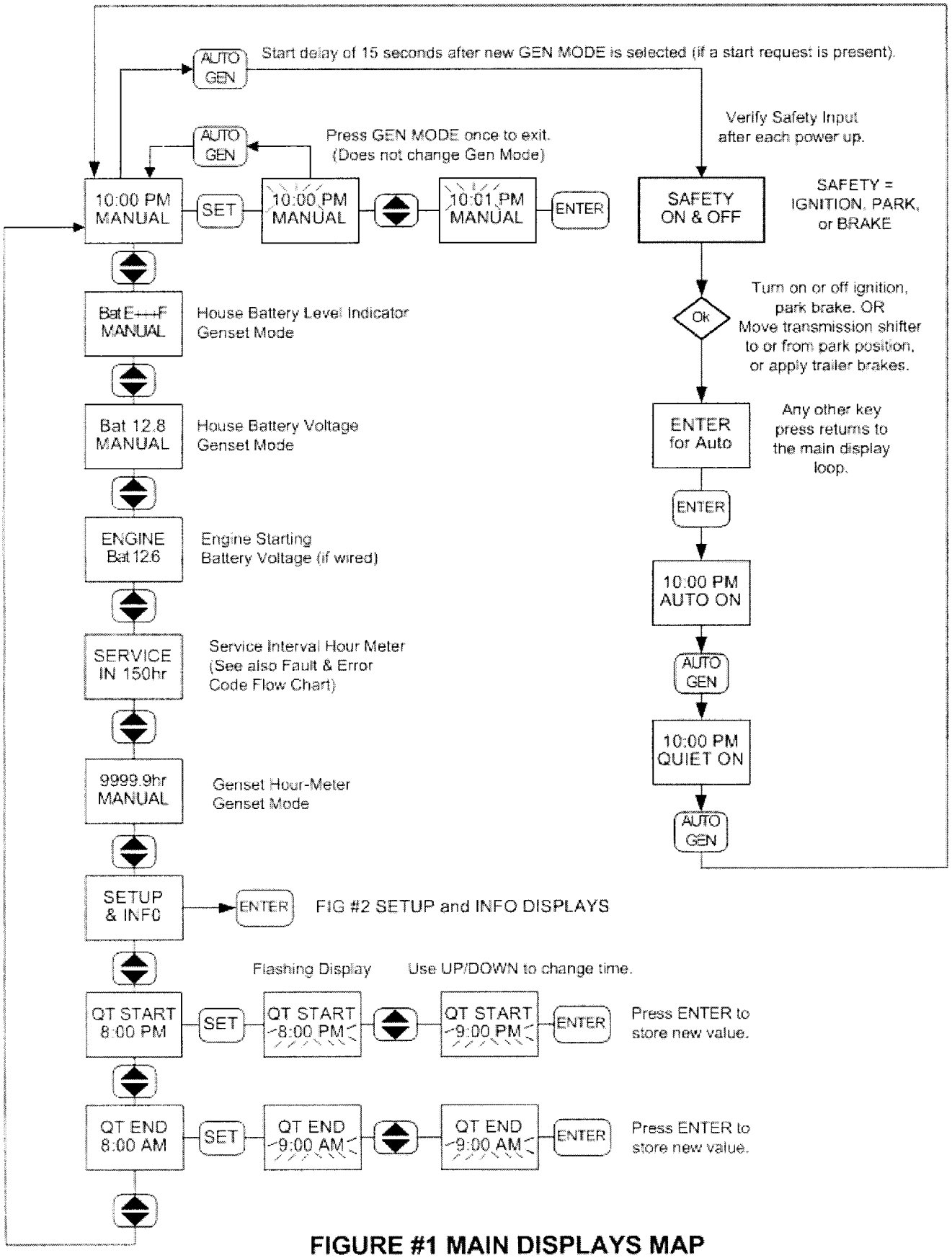


FIGURE #1 MAIN DISPLAYS MAP

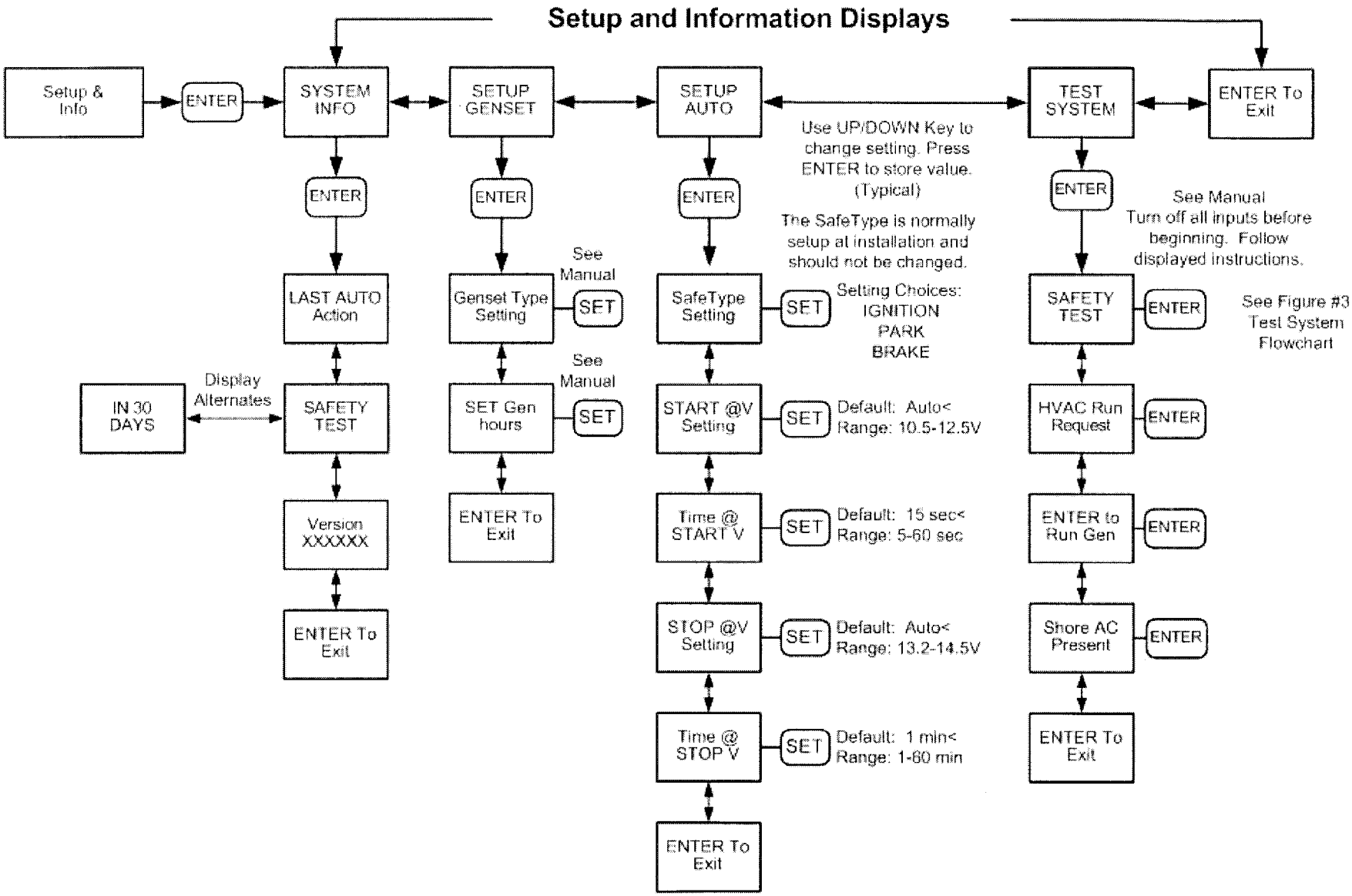


FIGURE #2 SETUP AND INFO DISPLAYS

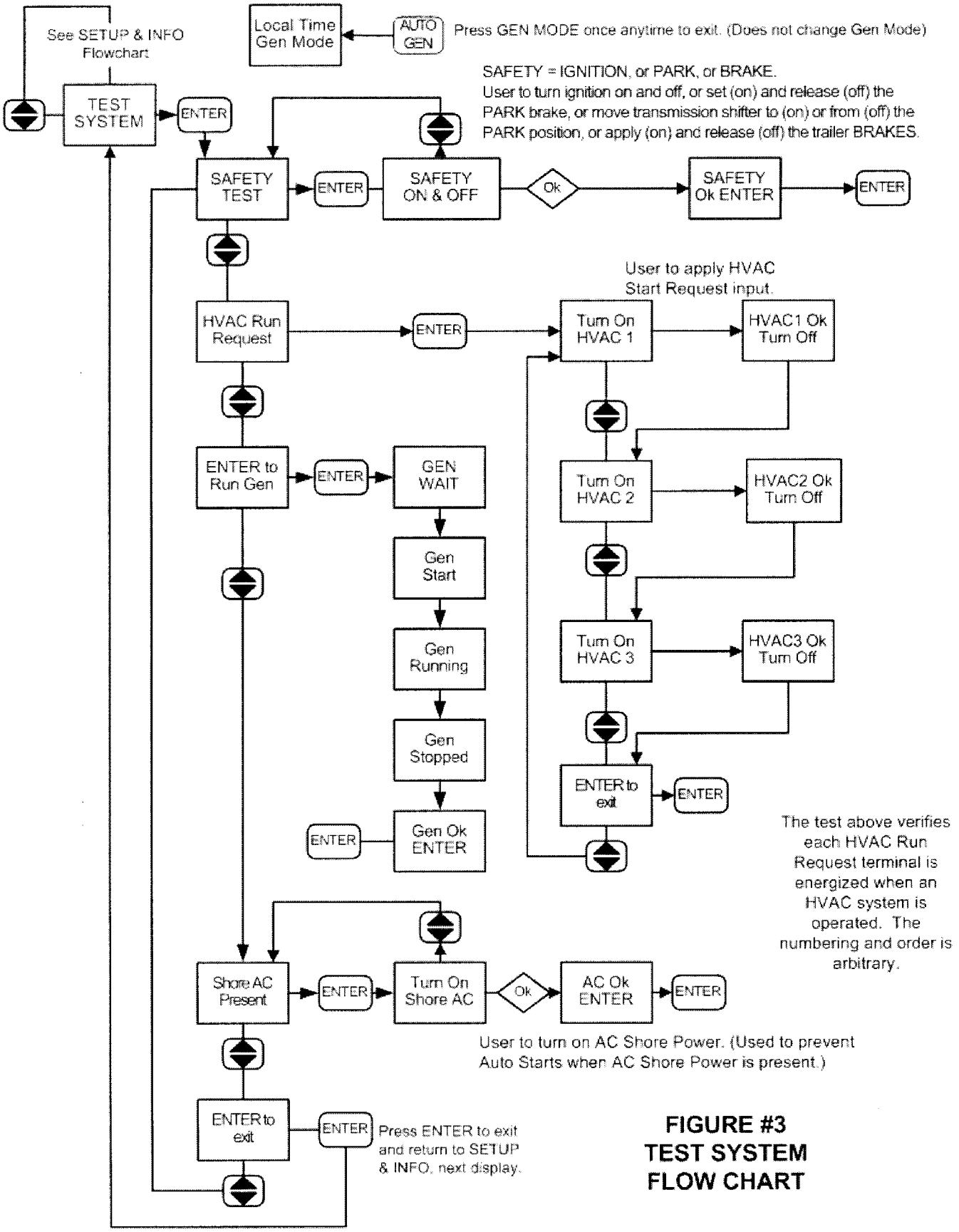


FIGURE #3
TEST SYSTEM
FLOW CHART

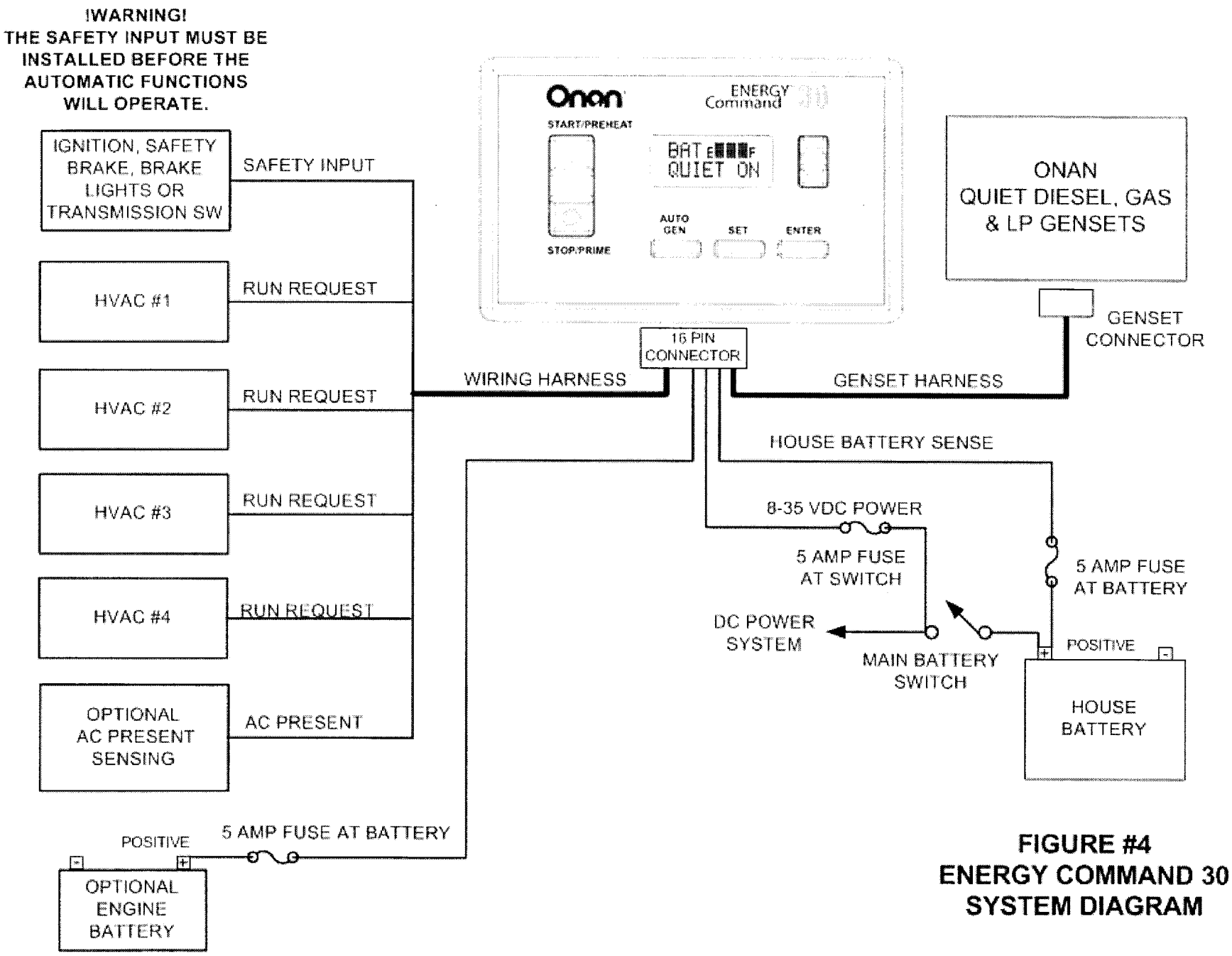


FIGURE #4
ENERGY COMMAND 30
SYSTEM DIAGRAM

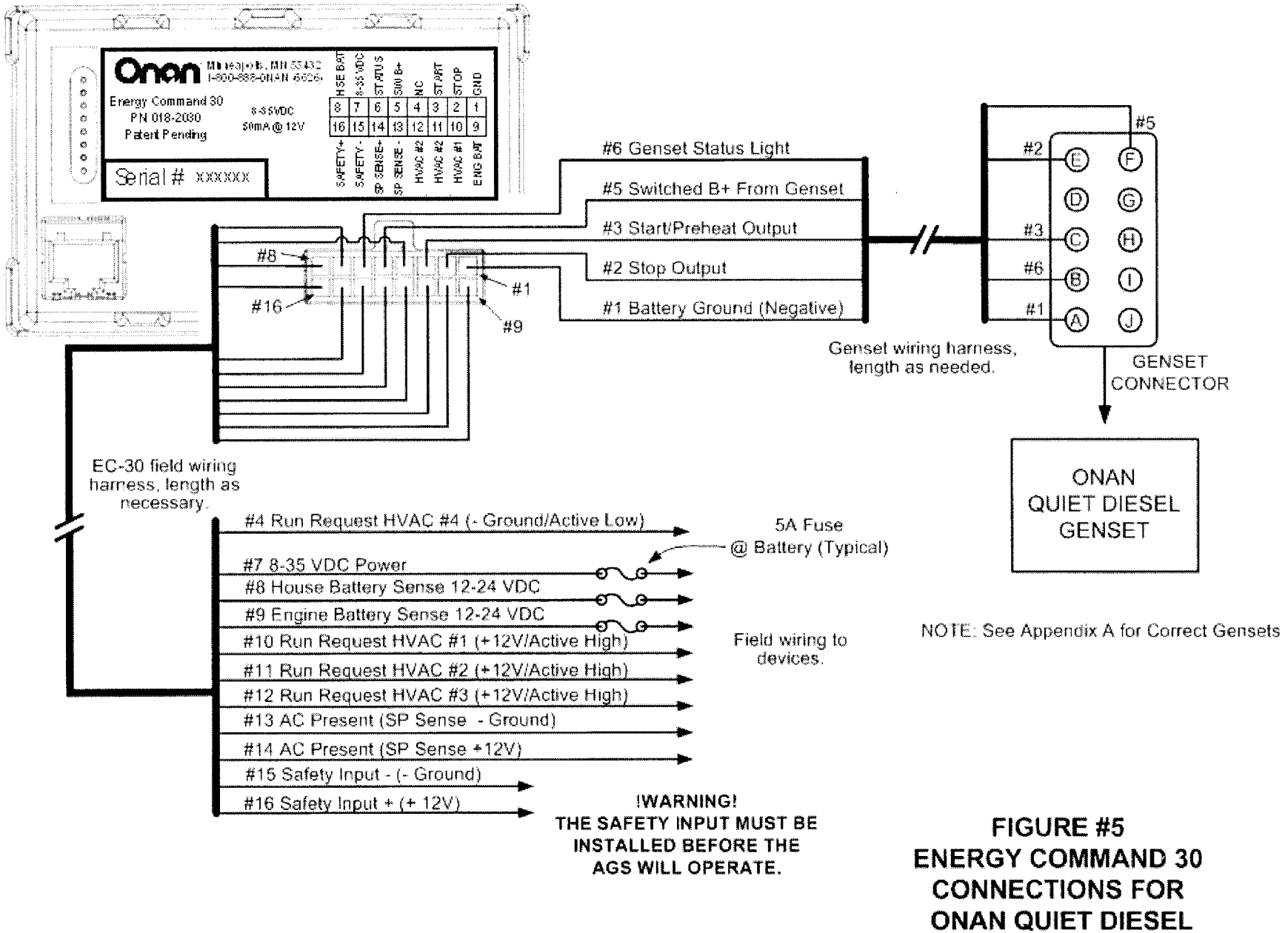


FIGURE #5
ENERGY COMMAND 30 CONNECTIONS FOR ONAN QUIET DIESEL

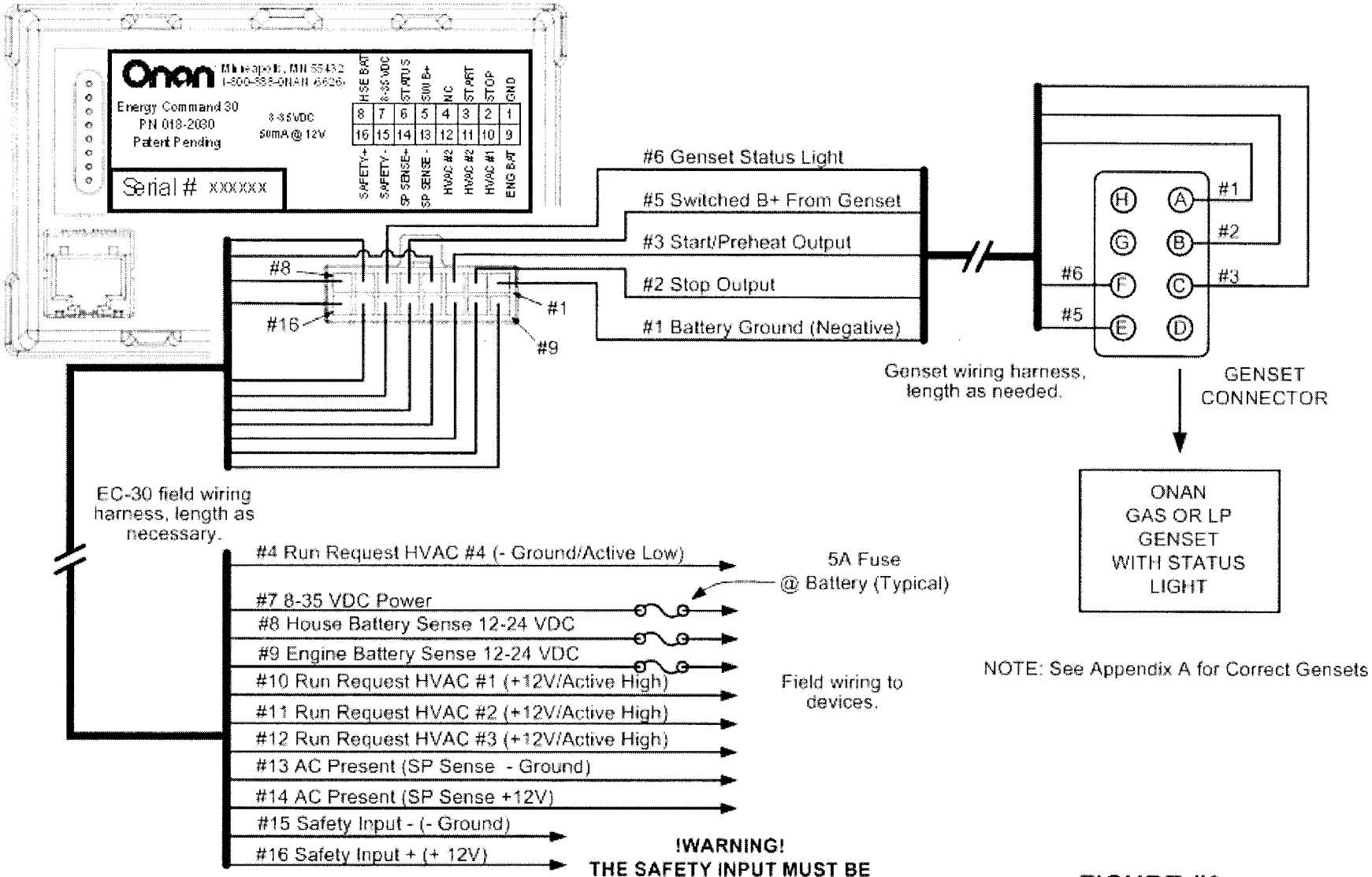


FIGURE #6
ENERGY COMMAND 30
CONNECTIONS FOR
GAS/LP WITH STATUS LIGHT

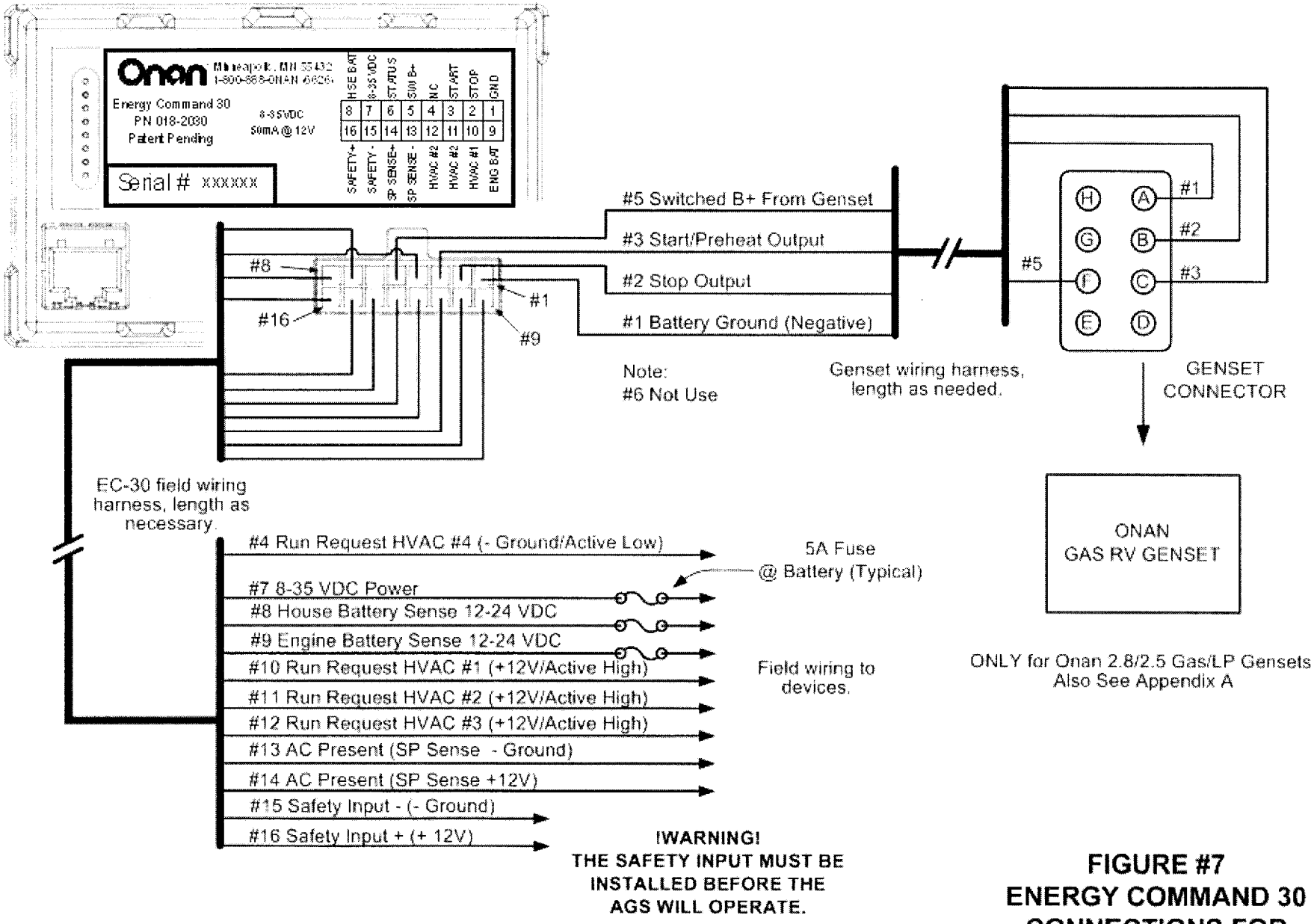
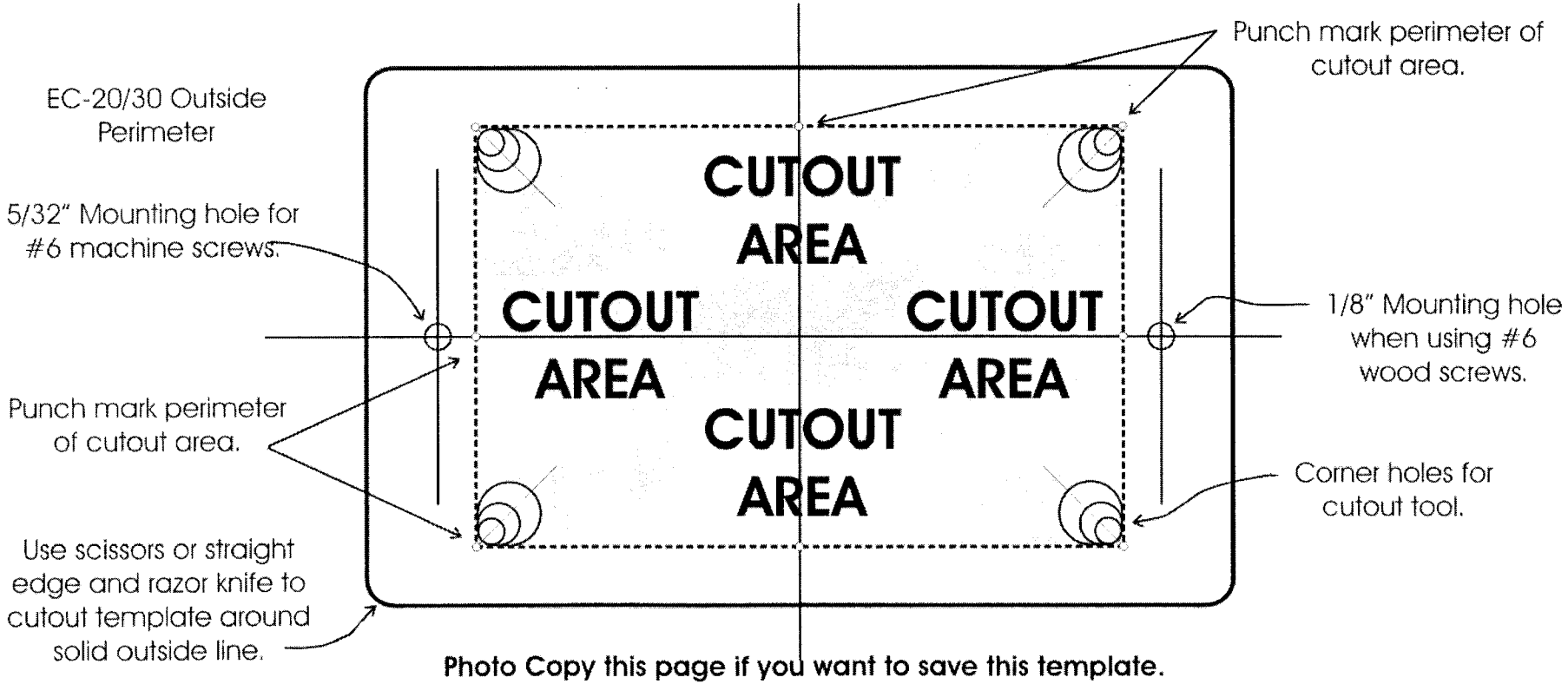


FIGURE #7
ENERGY COMMAND 30
CONNECTIONS FOR
GAS RV GENSETS

Use scissors to cut out template around the solid perimeter line. Use square or level to align template on mounting surface. Tape the template securely to the mounting surface. Use a center punch to mark the perimeter of the cutout area.

Depending on the tool to be used (Roto-zip tool recommended, reciprocating saw, or key hole saw) determine where to drill the corner starting holes. The edge of the bit should just touch the edge of the cutout area. Use the 45° line and the outlines of the three common drill sizes shown (5/32", 1/4", 3/8") to mark and punch the corner starting holes. Also lightly punch or mark the two mounting holes.

Remove the template and use the perimeter punch marks to draw an outline of the cutout area on the mounting surface. Drill the corner starting holes and use the selected tool to remove the cutout area. File the corners and as needed to fit. Align the EGR-1 and check that the mounting hole punch marks line up. Adjust mounting hole marks as needed and drill mounting holes appropriately for the screws being used to mount the unit.



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Mounting Template

Date: 08/06/04