LESLIE CONTROLS, INC. A subsidiary of CIRCOR International, Inc.	Installation, Operating and Maintenance Instructions	90/6.5.0 Rev. 1

UNFIRED STEAM GENERATOR
LVSG SERIES

TABLE OF CONTENTS

INTRODUCTION

This Installation, Operation, and Maintenance Manual is intended to be as complete and up to date as possible. It covers installation, operation, and maintenance procedures for Leslie Controls, Inc. Unfired Steam Generator and 2001 SSCM control module. Leslie reserves right to update this manual and other product information concerning installation, operation, and/or maintenance, at any time and without obligation to notify product owners of such changes.

Leslie is not responsible for inaccuracies in specifications, procedures and/or content of other product literature, supplied by manufacturers of components used in Leslie Controls, Inc. Unfired Steam Generator and 2001 SSCM control module Leslie strives to use only highest quality components; however, LESLIE has no direct control over their - manufacture, or their consistent quality.

Leslie is not responsible for injury to personnel or product damage due to improper installation, operation, and/or maintenance Leslie Controls, Inc. Unfired Steam Generator and 2001 SSCM control module. All installation, operation, and maintenance procedures should only be performed by trained/certified personnel. All personnel performing these procedures should completely and carefully read and understand all supplied materials before attempting procedures. All personnel should pay strict attention to all Notes, Cautions, and Warnings that appear within procedures detailed in this manual.

Leslie welcomes user input as to suggestions for product or manual improvement.

Contact Information

For information concerning warranties, or for questions pertaining to installation,
operation or maintenance of LESLIE products, contact:

LESLIE CONTROLS INC.
12501 Telecom Drive
Tampa, FL 33637
USA Phone: (813) 978-1000
USA Fax: (813) 978-0984
www.LESLIECONTROLS.com

To order replacement parts, contact LESLIE CONTROLS at address listed above, or call toll free:

USA/Canada/Caribbean Phone: (800) 323-8366

Note: Please include model and serial number of unit for which parts are being ordered. If ordering by phone, please have this information readily available.

General Notes and Warnings

Notes:

- This manual is intended to cover installation, operation, and maintenance procedures for Leslie Controls, Inc. Unfired Steam Generator and 2001 SSCM control module.
- If questions are not answered by this manual, or if specific installation, operation, and/or maintenance procedures are not clearly understood, contact Leslie Controls, Inc. for clarification before proceeding.
- All installation, operation, and maintenance procedures should be performed only by experienced, trained and certified personnel. Personnel should be trained in and familiar with correct piping and electrical procedures and methods, and should be experienced in working with hot/boiler water systems and steam systems.
- Leslie Controls, Inc. Unfired Steam Generator and 2001 SSCM control module and other electronic controls are designed for indoor use only, unless otherwise required by design specifications.
- If unit is damaged during installation, operation, or maintenance, complete following steps:

  1. Turn off and lock out electric power supply to unit in an approved manner.
  2. Turn off all incoming steam/hot water valves.
  3. Contact in-house maintenance personnel or Leslie Controls, Inc. for instructions.

Note: Throughout this manual, warnings will be denoted by BOXES

Warnings

WARNING!

As with any piece of equipment that utilizes hot/boiler water or steam and electricity, **potential exists for severe personal injury** if proper installation, operation, and maintenance procedures are not followed. Listed on following pages are specific warnings pertaining to LESLIE Electronic Controls. **All warnings should be carefully read and understood.** All precautions contained in warnings should be carefully followed to reduce chance of injury.

All documentation for each major component has been included with unit. It is strongly recommended that each document be reviewed before attempting any installation, operation, or maintenance procedures.

documentation for each major component may also contain warnings and cautions identified by manufacturer of each component. These warnings and cautions may be specific for particular component, and therefore not covered in this general Installation, Operation, and Maintenance Manual. They should also be carefully reviewed before attempting installation, operation, or maintenance procedures.

WARNING!

combination of electricity and water can pose a **very dangerous situation**. Assure that all power has been **shut off/disconnected and locked out** in an appropriate manner, before attempting any installation or maintenance procedures.

WARNING!

Areas of potential danger:

1. All electric power leads and connections;
2. All hot/boiler water lines, steam lines, joints, valves, and relief valves; and
3. All joints at valve, gauges, etc.

WARNING!

Before attempting any installation, operation, or maintenance procedures pertaining to unit.

1. Assure that electric power supply has been turned off and locked out in an approved manner;

WARNING!

Hot/boiler water and steam present a situation that can be very dangerous due to fact it is under pressure and at very high temperatures. To avoid possible injury or death, use common sense and follow all accepted and recommended procedures when performing installation, operation, and maintenance procedures **.**

Connecting Electric Power Source

WARNING!

All installation procedures involving electric power connection should only be performed by trained, certified electricians.

WARNING!

Hot/boiler water and steam present a situation that can be very dangerous because of high temperatures and pressures. Use common sense and follow all accepted and recommended procedures when performing installation, operation, and maintenance procedures to avoid possible injury or death.

WARNING!

combination of electricity and water can pose a very dangerous situation. Assure that all power has been shut off/disconnected and locked out in an approved manner, before attempting any installation or maintenance procedures.

LESLIE Steam Generators have been wired during assembly. Connecting electric power supply to unit consists of connecting correct voltage, phase, and amperage power leads to terminal strip or circuit breaker. Exact voltage, phase, and - amperage requirements for unit can be determined from rating plate affixed to jacket of unit, or from Submittal Sheet and Wiring Diagrams supplied with unit

Controller – Overview

LESLIE SSCM 2001 control module is a solid state controller designed to control limit, water feed, alarm, and timed blowdown functions for LESLIE unfired steam generators.

Solid State Control Module is supplied with a LED backlit LCD display. LED pilot lights are supplied to indicate On-Off, high pressure, low pressure, low water, high water, water feed, and blow down. Solid state control module allows owner to set pressure limits on display screen. Solid state control module has a flashing red alarm light and alarm horn with built in alarm silence relay. Solid state control module is supplied with dry contact closure outputs to indicate to building automation control (BAC) Power on, Low water, High pressure, Water feed, High water, Low pressure and Blow down occurring. Control module allows BAC to turn Unfired Steam Generator on or off through a remote relay suitable for 24 VAc, 1 amp. Control module allows BAC to remotely monitor operating pressure. Control module is supplied with an on-off switch and is mounted in a NEMA 4 enclosure.

Built in remote start stop: This feature allows Unfired Steam Generator to be started or stopped from a remote location. Typically this would be accomplished from Building Automation Control (BAC) . Requires a dry contact suitable for 24 VAc and 1 amp. Terminals P2 on panel are where BAC on-off is wired.

Built in On-Off Switch: Allows for local on-off and is convenient for service in unlikely event service is required. This switch is mounted in side of panel.

Built in Alarm Horn: alarm horn will sound and fault LED will light (blinking red) on low water or high pressure If either high water or low pressure options are selected alarm horn will also sound and alarm light will light (blinking red) in event of high water or low pressure. 2001 Solid State Control Module also features an alarm silence relay which will silence alarm but not fault light when generator is being serviced. When fault is cleared both alarm and fault light will automatically reset.

Built in timer for timed blow down: If timed blowdown option is selected time and duration of blow down can be easily selected in Leslie 2001 Solid State Control Module.

Built in relay for water feed: Leslie 2001 Solid State Control Module operates in conjunction with level control to signal feed water solenoid or feed water pump to maintain correct water level in unfired steam generator.

Built in operating pressure readout: Leslie 2001 Solid State Control Module features an easy to read LED digital readout of operating pressure.

Built in high pressure cut off and alarm: In event of high pressure Leslie 2001 Solid State Control Module will close source steam or HTHW supply valve and sound an alarm.

Power ON
Low water
High water
Water feed
High pressure
Low pressure
Blow down operating
Optional input / output
Alarm
Operating pressure (via a 0-10 Vdc signal)

Built in low water cut off and alarm: In event of low water Leslie 2001 Solid State Control Module will close source steam or HTHW supply valve and sound an alarm.

Built in low pressure alarm: If activated, Leslie 2001 Solid State Control Module will sound an alarm if a low pressure condition occurs.

Built in optional input / output.
Built in LED display of functions and alarms: Leslie 2001 Solid State Control Module is designed for user to tell at a glance how system is operating. Built in LED displays make troubleshooting simple.

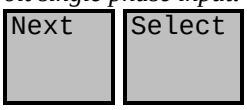
Function	**LED Indicator 1**	**LED Indicator 2**
Power ON	Green = Power On	Blank = No power
Low water	Green = Water level not low	Red = Low water
High pressure	Green = Normal pressure	Red = High pressure
Water feed	Green = Water feeding	Blank = Water not called for
High water	Green = Water level normal	Red = High water
Low pressure	Green = Pressure not low	Red = Low pressure
Blow down operating	Green=Blowdown occurring	Blank = No Blowdown
Optional input/output		

Built in contacts to notify BAC (Building Automation Control) of functions and alarms: This control allows for simple and reliable interface from a remote location. BAC can also start and stop unfired steam generator.

Contractor Wiring

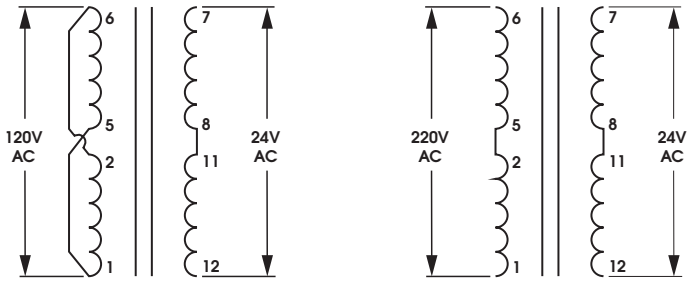
All Power Connections should be performed by a trained, certified electrician. Be sure factory supplied on-off switch is in OFF position before connecting to building power.

Field wiring**: Installer must run feed wires to terminals on panel mounted on-off disconnect switch and green ground wire to ground lug.** *Units are normally wired for 120 volt single phase input.*



WARNING!

Before drilling hole in panel for conduit connection of power carefully open door and verify that nothing in panel will be interfered with. BE CAREFUL not to get any drill shavings or metal slug on board or transformer or disconnect switch.



Panel is normally factory shipped for 120 Volt/ 1 phase/60/50 Hz. If so desired 220/1/50 or 60 Hz power can be used. To convert to 220 volt input it is necessary to reconfigure 24 volt output transformer. Below is wiring diagram for 120 volt and 220 volt input.

CAUTION!

Before attempting to rewire transformer be sure power coming to unit is turned off and locked out in an approved manor

Ratings

Input: selectable 120/220 VAC – 50/60 Hz @120 Vac min 90 volt max 130 volt
Output Contacts: 1 amp at 24 Vac
Building Automation outputs: Dry contacts, NO/NC .5 amp maximum, non inductive
Display: LED display with resolution of
.3 % of scale
Available pressure ranges: 0-30 PSI, 30 – 150 PSI in 10 PSI increments
Operating ambient temperature: Min 32 Deg F max 140 deg F
Operating Humidity: 5% to 95% relative humidity (RH) non condensing
Alarm approximately 103 db.
NEMA 4 enclosure

LESLIE 2001 SCCM is a self contained board and can not be field repaired. For a replacement board contact LESLIE Corporation at address shown on page one of this manual.

Controller Screens

There are two tactile keys on front of panel. Left key, labeled NEXT, is pushed to select desired function. Right key, labeled SELECT, is pushed to access desired screen. Both function and setting are read on LED backlit LCD display.

Pushing left key will display, in sequence, following screens

Screen 1 (Home)		**Screen 2**
MODE[NORMAL] PRESSURE PSI [XXX]		B-DOWN DURATION
Screen 3		**Screen 4**
B-DOWN INTERVAL		HIGH PRESSURE
Screen 5		**Screen 6**
LOW PRESSURE		DIFFERENTIAL
Screen 7		**Screen 8**
PRESSURE SENSOR		LEVEL CONTROL
Screen 9		**Screen 10**
INITIAL SETTINGS		DIAGNOSTICS
Screen 11		**Screen 12**
ABOUT		QUIT

After 60 seconds in any screen ”Home” screen will be displayed

Setting Controller

There are two tactile keys on front of panel. Left key, labeled NEXT, is pushed to select desired function. Right key, labeled SELECT, is pushed to access desired screen. Both function and setting are read on LED backlit LCD display. sequence to access and change any screen is as follows:

1. Press “NEXT” (left key) key until desired function appears on screen.
2. Press “SELECT” (right key) and a setting will appear on second line of screen.
3. Press “NEXT” key to change setting . Continue pressing “NEXT” key, which will scroll though available settings until desired setting is on screen.
4. Press “SELECT” key which will store last screen setting into memory and return to controller screen to “HOME”

Screen Listing

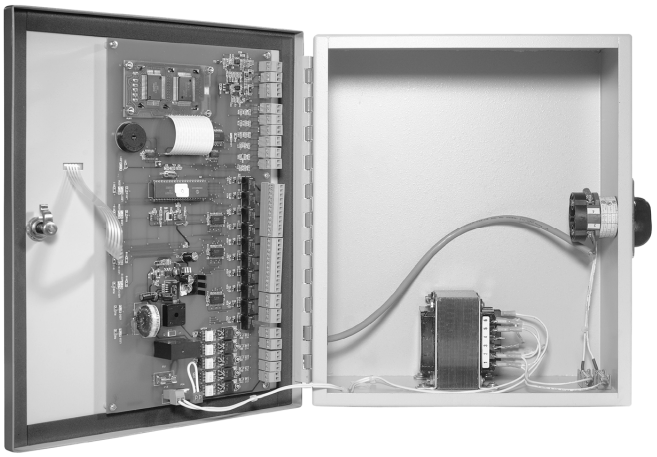
This is screen which should be displayed during normal operation:

Screen 1 (Home)		**Screen 2**
MODE[NORMAL] PRESSURE PSI [XXX]		B-DOWN DURATION
Screen 3		**Screen 4**
B-DOWN INTERVAL		HIGH PRESSURE

Screen 5		**Screen 6**
LOW PRESSURE		DIFFERENTIAL
Screen 7		**Screen 8**
PRESSURE SENSOR		LEVEL CONTROL
Screen 9		**Screen 10**
INITIAL SETTINGS		DIAGNOSTICS
Screen 11		**Screen 12**
ABOUT		QUIT

CAUTION!

Conduit and piping system must be adequately designed and supported to prevent extraordinary loads to pressure/ electrical equipment.



There are two tactile keys on front of panel. Left key, labeled NEXT, is pushed to select desired function. Right key, labeled SELECT, is pushed to access desired screen. Both function and setting are read on LED backlit LCD display. sequence to access and change any screen is as follows:

1. Press "NEXT" (left key) key until desired function appears on screen.
2. Press "SELECT" (right key) and a setting will appear on second line of screen.
3. Press "NEXT" key to change setting . Continue pressing "NEXT" key, which will scroll though available settings until desired setting is on screen.
4. Press "SELECT" key which will store last screen setting into memory and return to controller screen to "HOME"

Instructions for Setting Each Screen

Home Screen

This is screen which should be displayed during normal operation:

Screen 1 (Home)
MODE
[NORMAL] PRESSURE PSI [XXX]

MODE can be either NORMAL or ALARM. Mode will read normal in normal operation and alarm if any alarm condition occurs. If an alarm condition is cleared mode will switch back to normal reading.

Pressure psi: This is pressure of generated steam.

Timed Blow down

If timed blow down is a option which was purchased duration and interval of blow down can be selected. Duration is length of time blow down occurs (in seconds) and interval is number of hours between blow downs.

To set duration of blow down:

1. Press NEXT key once and following screen will appear.

Screen 2
BLOW DOWN DURATION

2. Press SELECT key and screen will read.

Screen 3
BLOW DOWN DURATION
SECONDS [XXX]

3. Press NEXT key to scroll through various seconds settings until desired number of seconds of blow down appears on screen. seconds will read 0-250 seconds in 10 second increments.

4. Press SELECT key to place setting in memory and to return to home screen.

NOTE: To disable timed blow down set duration to zero (0)

To set interval:

1. Press NEXT key twice and following screen will appear:

Screen 3
B_DOWN INTERVAL

2. Press SELECT key and screen will read:

Screen 3
B- DOWN INTERVAL
HOURS [XXX]

3. Press NEXT key to scroll through various hour settings until desired number of hours between blow downs appears on screen. Hours will read 0-30 hours in one hour increments and 40 through 160 hours in 10 hour increments.

4. Press SELECT key to place setting in memory and return to home screen.

NOTE: To disable timed blow down set interval to zero (0)

High pressure cut out
This is pressure limit which is set 10-20% higher than desired operating pressure. When high pressure cut out pressure is reached controller will cause main control valve to close.

> **CAUTION**
> Operating pressure is set by control valve controller, see USG I O & M manual for setting operating pressure.

1. Press NEXT key three times and following screen will appear:

Screen 4
HIGH PRESSURE

2. Press SELECT key and screen will read:

Screen 4	
HIGH PRESSURE	
CUT OFF PSI	[XXX]

3. Press NEXT key to scroll through pressure settings until desired pressure setting appears on screen.. Settings from 0-50 psi are in 1 psi increments and from 50 through 150 psi in 5 psi increments. NOTE: MAXIMUM SETTING IS LIMITED BY RANGE OF PRESSURE SENSOR. **high pressure setting should be set lower than relieving pressure ASME relief valve supplied with generator.** Pressure rating of relief valve is labeled on relief valve body.
4. Press SELECT key to place setting in memory and return to home screen.

Low pressure alarm
If desired a low pressure alarm can be set. This will alarm if generated steam pressure falls below low pressure setting.

To set low pressure alarm:

1. Press NEXT key four times and following screen will appear:

Screen 5
LOW PRESSURE

2. Press SELECT key and screen will read:

Screen 5	
LOW PRESSURE	
ALARM PSI	[XXX]

3. Press NEXT key to scroll through pressure settings until desired low pressure setting appears on screen.. Settings from 0-50 psi are in 1 psi increments. Maximum low pressure setting is equal to high pressure setting set on screen 4.
4. Press SELECT key to place setting in memory and return to home screen.

NOTE: To disable low pressure alarm set pressure to zero (0).

High and low pressure reset differential
This is pressure differential from set point at which high or low pressure will reset. Normally it is set at 2 psi but can be set from 1 to 10 psi. NOTE: There is only one differential setting and it will be same for both high and low pressure.

To set pressure differential:
1. Press NEXT key five times and following screen will appear:

Screen 6
DIFFERENTIAL

2. Press SELECT key and screen will read:

Screen 6	
DIFFERENTIAL	
RESET PSI	[XXX]

3. Press NEXT key to scroll through psi settings until desired psi differential is displayed. Range is 1-10 psi.
4. Press SELECT key to place setting in memory and return to home screen.

Setting Pressure Sensor Range
pressure sensor supplied with Unfired Steam Generator will have a specific range, normally 0-30 psi or 0-60 psi or 0-150 psi. **It is extremely important that range of pressure sensor and range listed in solid state controller be same range.** Generator is factory shipped with matched ranges. Range of sensor will be printed on body of sensor. Range of controller can be determined and if necessary changed as follows:

1. Press NEXT key six times and following screen will appear:

Screen 7
PRESSURE SENSOR

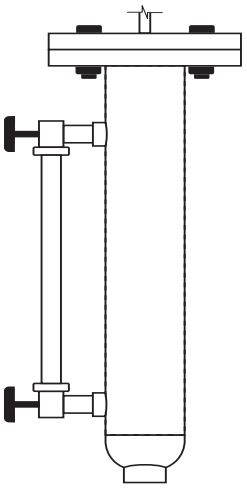
2. Press SELECT key and screen will read:

Screen 7	
PRESSURE SENSOR	
RANGE PSI	[XXX]

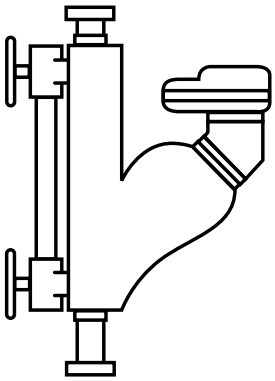
3. Verify that psi range shown is equal to range of supplied sensor. Range shown on screen is upper end of range. 0-30 will appear as 30 on screen, 0-60 will appear as 60 on screen , etc. <u>IF AND ONLY IF range of sensor is different than screen setting should screen setting be changed.</u> To change screen setting press NEXT key to scroll through various pressure settings. Available ranges are 30-150 psi in 10 psi increments. When desired pressure range appears on screen verify that this matches pressure of sensor.
4. If both pressures match press SELECT key to place setting in memory and return to home screen.

Level control type
There are two types of level controllers, either one of which may be supplied with Unfired Steam Generator. First type is a 4 ball float assembly type mounted in a stainless steel body with a shape as shown below. This is TYPE [0]. second type is a one ball float type with multiple switches in a cast iron body with a shape as shown below. This is TYPE [1].

Type 0



Type 1



It is extremely important that type of level control supplied and type listed in solid state controller be same. Generator is factory shipped with matched types.

1. Press NEXT key 7 times and following screen will appear:

Screen 8
LEVEL CONTROL

2. Press SELECT key and screen will read:

Screen 8	
LEVEL CONTROL	
TYPE	[XXX]

3. Verify that type listed on screen and type supplied on Unfired Steam Generator are same. IF AND ONLY IF type of level control is different than screen setting should screen setting be changed. To change screen setting press NEXT key to scroll through two types

4. If both types match press SELECT key to place setting im memory and return to home screen.

Initial Settings
Initial settings are for factory use only and can not be accessed

Diagnostics
Are used for factory testing and are not field useable. To go to "home" screen press Alarm Silence.

Screen 10
PRESSURE SENSOR

About
This screen lists version of controller. When contacting factory about controller be sure to mention version.

1. Press NEXT key 10 times and following screen will appear:

Screen 11
ABOUT

2. Press SELECT key and screen will read:

Screen 11	
ABOUT	
LESLIE VER	[XXX]

3. Be sure to note version when contacting factory.
4. Press SELECT key to return to home screen.

Quit screen
This screen is **only** used to return to home screen.

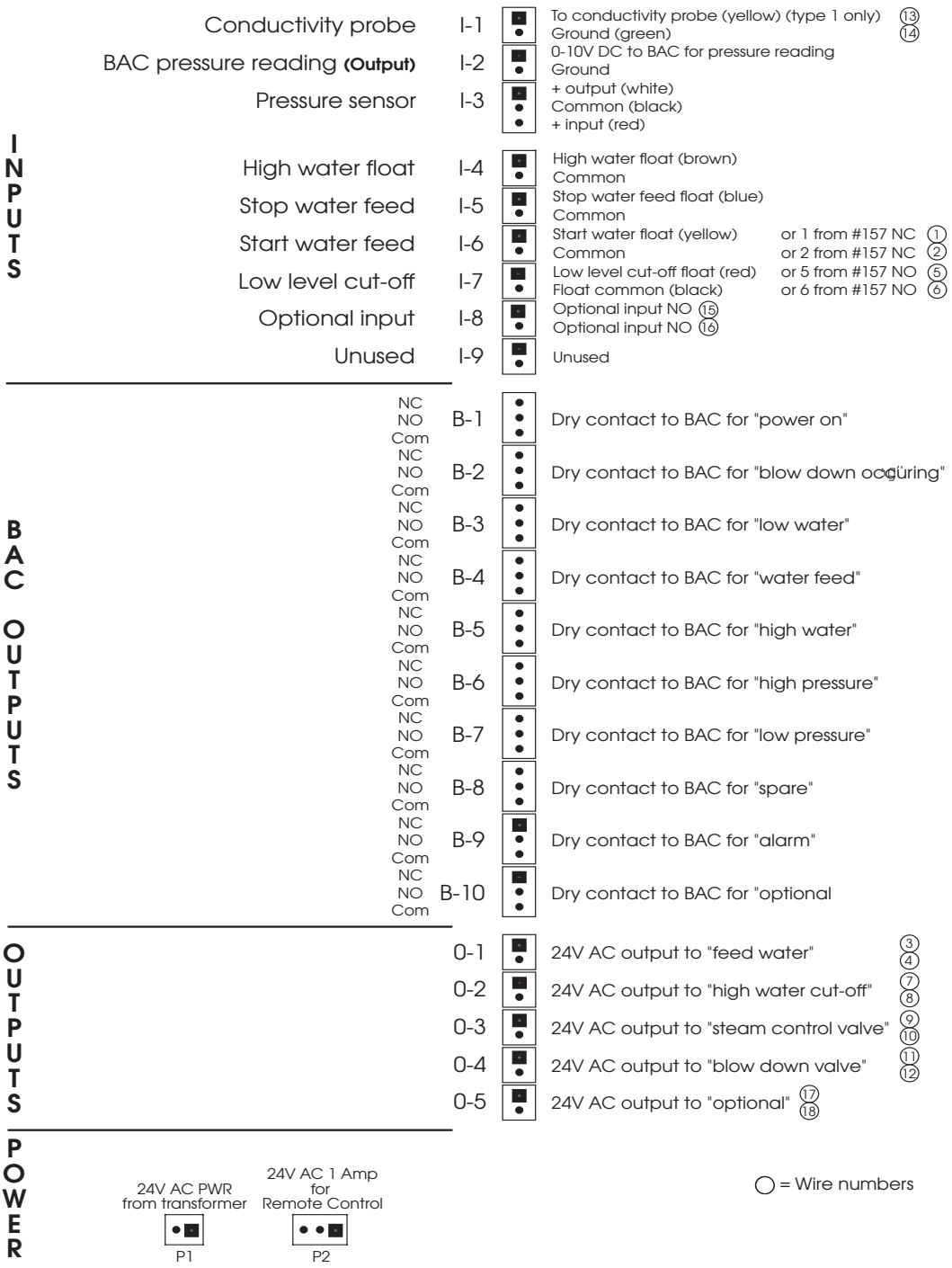
1. Press NEXT key eleven times and following screen will appear:

Screen 12
QUIT

2. Press select key and program will return to home screen.

Note: After 60 seconds in any screen "home" screen will be displayed

Terminal Board Layout



Building Automation Control (BAC) Interface

LESLIE 2001 SSCM has built in contacts to interface with building automation control (BAC).

Remote On-Off:
Terminal block P-2 is a three pole block with two outside poles connected in series with 24 VAC incoming power from supply transformer. Unfired Steam Generator is shipped with a jumper installed between terminals 1- 3 of terminal block P-2. To wire for remote on-off remove this jumper and install a switch or relay contacts connecting terminals 1 and 3. Do not connect anything to terminal 2 of P-2.

CAUTION

TERMINALS 1 -3 ARE 24 VAC AND WILL HAVE A LOAD OF 1 AMP. BE SURE SWITCH OR RELAY CONNECTED TO THESE TERMINALS IS RATED FOR A MINIMUM OF 24 VAC 1 AMP.

Built in contacts to notify BAC of functions and alarms: This control allows for simple and reliable interface with BAC via dry contact to enable BAC to monitor following functions from a remote location:

Power ON
Low water
High water
Water feed
High pressure
Low pressure
Blow down operating
Optional input / output
Alarm

Refer to "Terminal Board Layout" page of this manual for key to and location of terminal connections to BAC. Note that all of function relays give either a COM-NO or COM-NC dry contact output. Rating of dry contacts are 1 amp at 24 VAC or .5 amp at 120 VAC.

CAUTION

Do not connect any voltage above 120 volts across BAC contacts on terminal block..

Contact closure as follows:

Power ON	COM - NO contact made when power is on
Low water	COM - NO contact made when in low water condition
High water	COM - NO contact made when high water occurs
Water feed	COM - NO contact made when water is feeding
High pressure	COM - NO contact made when high pressure occurs
Low pressure	COM - NO contact made when low pressure occurs
Blow down operating	COM - NO contact made when blow down occurs
Optional input	COM - NO contact made when optional contact close
Alarm	COM - NO contact made when any alarm occurs

Operating pressure (via a 0-10 VDC signal);
Terminal block I-2 will output a 0-10 VDC signal. This signal will be scaled to pressure range of supplied pressure sensor. To scale BAC : Determine pressure range printed on body of supplied sensor and scale 0-10 VDC output signal to this range. This range should
also be listed in submittal supplied for generator.

CAUTION

bottom terminal of 1-2 is connected to an isolated chassis ground. This may interfere with BAC system. BAC engineering should determine if BAC needs isolation for this signal.

CAUTION

No current should be applied to terminals I-2.

TROUBLE SHOOTING

CONDITION	CHECK
Any	• Check all alarms and lights on controller
Cold water	• Electrical power source and all electrical connections. • Steam source stopped.
No water	• Clogged piping • No water supply
Low water	• Clogged water supply line • Closed shut off supply valve
High pressure	• Steam supply pressure
Low pressure	• Leak in steam supply • Low steam pressure supplied

LESLIE CONTROLS, INC.
A subsidiary of CIRCOR International, Inc.

It is solely responsibility of system designer and user to select products and materials suitable for their specific application requirements and to ensure proper installation, operation and maintenance of these products. Assistance shall be afforded with selection of materials based on technical information supplied to Leslie Controls Inc.; however, system designer and user retain final responsibility. designer should consider applicable Codes, material compatibility, product ratings and application details in selection and application. Improper selection, application or use of products described herein can cause personal injury or property damage. If designer or user intends to use product for an application or use other than originally specified, he must reconfirm tat selection is suitable for new operating conditions. Life expectancy for this product defaults to the warranty period of the sales contract.