

SETUP AND OPERATING INSTRUCTIONS

Mark II Diesel Engine Fire Pump Controllers



NS1100-30(A)

IMPORTANT - DO NOT DISCARD



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INTRODUCTION

Firetrol® FTA1100 combined automatic and manual diesel engine fire pump controllers are intended for starting and monitoring fire pump diesel engines. They are available for use with 12 or 24 volt negative ground systems using lead acid or Nickel-Cadmium batteries. FTA1100 fire pump controllers are listed by Underwriters Laboratories Inc., in accordance with UL218, *Standard for Fire Pump Controllers*, CSA, *Standard for Industrial Control Equipment* (cUL), and approved by Factory Mutual. They are built to meet or exceed the requirements of the approving authorities as well as NEMA and the latest editions of NFPA 20, *Installation of Centrifugal Fire Pumps*, and NFPA 70, *National Electrical Code*.

These instructions are intended to assist in the understanding of the installation and operation of the FTA1100. Read through these instructions thoroughly prior to connecting the controller. If there are any questions unanswered in these instructions, please contact the local Firetrol representative or factory service department.

MOUNTING LEGS (OPTIONAL)

Procedure—

1. If legs were supplied, unpack legs and mounting hardware.
2. Inspect legs for damage.
3. Place shipping carton tube on floor and gently lay the controller, on its back, on top of tube.
4. Attach each leg to the bottom of the enclosure using the 3 nuts, and washers provided for each leg. Tighten nuts securely.
5. After legs are securely attached, stand the controller up on its legs for floor mounting. Each leg has 3 holes on the bottom for anchoring to the floor or base plate.

Caution—Controller is **not** free standing! Controller must be secured to floor or wall surface before opening door or operating.

MOUNTING CONTROLLER—

Note—Consult the appropriate job plans to determine controller mounting location. Controller must be mounted within 20 feet of the engine.

Tools and Materials (all mounting):

1. Assortment of common hand tools of the type used to service electromechanical equipment.
2. Drill for drilling wall/floor anchor holes.
3. Hand level.
4. Tape measure.
5. Four (4) anchors with bolts and washer—if wall mount. Six (6) anchors, bolts and washers—if floor/base mount.

Wall Mount—

Note—Refer to the controller dimension drawing, DD1100, included in the instruction manual for necessary mounting dimensions.

The controller is wall mounted by using four (4) wall anchors, 2 anchors for the top ears and 2 anchors for the bottom mounting slots. The ears and slots are dimensionally on the same center-line for ease in mounting.

1. Using either the dimension print or by measuring the distance between the center lines of the 2 lower slots, transcribe this dimension onto the wall. Note: The bottom edge of the enclosure should be a minimum of 12" (305 mm.) from the floor in case flooding of the pump room occurs.

2. Drill and put 2 anchors into the wall for the 2 lower slot mounts.
3. Mark on the wall, the location of the holes in the upper mounting ears.
4. Drill and put 2 anchors into wall for the upper mounts.
5. Install bolts and washers in 2 lower anchors, leaving a gap between the washer and wall.
6. Lift the controller and place the mounting slots down onto the 2 lower anchor bolts. Do not tighten bolts.
7. Align holes in upper mounting ears and install 2 bolts and washers in anchors.
8. Tighten all 4 anchor bolts.
9. Check to be sure enclosure door opens freely and that enclosure is level.

Floor/Base Plate Mount—

Note—Consult the appropriate job plans to determine controller mounting location. Refer to the controller dimension print, DD1100, included in the instruction manual for necessary mounting dimensions.

The controller is floor/base plate mounted by using the 3 pre-drilled holes in each leg. The holes are dimensionally on the same centerline for ease in mounting.

1. Using either the dimension print or by measuring distance between the centerlines of the holes on one leg, transcribe these dimensions onto the floor/base plate.
2. Drill 3 holes in floor/base plate for anchoring the leg.
3. Mark location of holes for opposite leg and drill 3 more holes.
4. Secure controller to floor/base plate with bolts and washers and tighten.
5. Check to be sure enclosure door opens freely and that enclosure is level.

MAKING ELECTRICAL CONNECTIONS

Important Precautions—

Prior to making any field connections:

1. Verify that the following information is compatible with other related equipment on the project:
 - Firetrol catalog number
 - Engine voltage and polarity of grounding
 - Incoming line voltage and frequency
 - System pressure
2. Project electrical contractor must supply all necessary wiring for field connections in accordance with the *National Electrical Code*, local electrical code and any other authority having jurisdiction .
3. Open door of enclosure and inspect internal components and wiring for any signs of frayed or loose wires or other visible damage.
4. Refer to the appropriate field connection drawing in the manual for all wiring information.

Procedure—

All field connections, remote alarm functions and AC wiring must be brought into the enclosure near the bottom. (See dimension drawing DD1100 for exact location). Proceed as follows:

1. Use a hole punch, not a torch nor a drill, and punch a hole in the enclosure for the size conduit being used.
2. Install necessary conduit.

Warning—Use only locations shown on Dimension Drawing DD1100 for conduit entrance. Controller warranty is VOID if any other location is used.

Note—All field wiring connections are connected to the terminal block located at the bottom of the enclosure. Terminals 1 through 12 are for interconnection to the corresponding

numbered terminals on the engine terminal block. All terminals are not used in all controllers. Reference engine wiring diagram and Field Connection Diagram FC1100.

Other terminals are for connecting remote alarm functions and optional features.

AC line connections are made to terminals L1 and L2. A ground lug, marked “G” is provided for grounding. This AC circuit should come from a distribution panel and have a circuit breaker rated for 25 Amps, sized in accordance with the *National Electrical Code* and other local codes. L1 should be hot (black wire) of 120 Volt system, L2 should be neutral (white wire). On 220 Volt systems, both L1 and L2 wires should be hot (black).

3. Pull all wires necessary for field connections, remote alarm functions, AC power and all other optional features. Allow enough excess wire inside enclosure to make up connections to the terminal block. Be sure to consult the appropriate field connection diagram included with the manual.

Warning—Do not use controller wire way for routing external wiring.

Wire Sizes—

- Use #14 AWG wire minimum for all electrical connections except for battery charger connections. (Battery chargers connected to terminals 6, 8, and 11.)
- On terminals 6, 8, and 11, use the following information to determine wire sizes:

Linear feet (in conduit run) from controller to terminal block on engine	Maximum Wire Size
0' to 25' (0 to 7.62 m.)	#10 AWG (6 mm ²)
25' to 50' (7.62 m. to 15.24 m.)	#8 AWG (10 mm ²)

4. Make all field connections to remote alarm functions and any other optional features. Do not connect AC power.
5. Verify AC line voltage and frequency with the controller data plate on the enclosure door prior to connecting AC power.
6. Connect AC power to “L1” and “L2”—120 Volt, 60 Hz or as called for on controller.
7. Connect remote normally open START pushbutton wires to terminals “13” and “14” (if used).
8. If deluge valve is used, remove jumper from terminals “16” and “17”. Connect wires from normally closed contact on deluge valve to terminals “16” and “17”.
9. Connect remote normally open shutdown interlock wires to terminals “15” and “16” (if used). A factory installed jumper will be installed on these terminals. If installing a interlock, this jumper may be removed, otherwise leave jumper in place until the set up of the Mark II is complete.
10. Check to see that all connections are both correctly wired (in accordance with field connection diagram) and tight.
11. Close enclosure door.

MAKING SYSTEM PRESSURE CONNECTIONS

The FTA1100 controller requires one (1) “System Pressure” connection from the system piping to the enclosure. The connection fitting, 1/2" FNPT, is provided on the bottom, external side of the enclosure for this purpose.

The “Test Drain” connection, located to the left of the “System Pressure” connection, should be piped to a vented drain or to waste. The “Test Drain” is used only briefly during the weekly test cycle.

Note—Test drain line must be free flowing. Do not use any valves or plugs on this line.

Refer to NFPA 20 for correct field piping procedure of sensing line between the pumping system and the controller.

SECTION 2

Mark II Set Up

User Passwords:

Adjusting the settings of the Mark II can severely effect the operation of the fire pump controller. Any adjustments should be done by qualified personnel. This manual will refer to an “operator” level password and an “supervisor” level password. The “operator” level password allows changes that might normally be made by maintenance personnel. The “supervisor” password allows changes that may more seriously affect the operation of the fire pump controller. A “supervisor” level password might be required by well-trained maintenance personnel, pump distributors or manufacturers representatives.

The “operator” level password is shown below. This password is also on a label affixed to the back of the Mark II on the inside of the controller door. Although this password may be changed, it is not recommended. Cost to the owner may be incurred if the factory password is changed, then forgotten.

When prompted for the Operator Level password enter the following key sequence:

METER-MENU-METER-MENU-PRINT-ENTER

The Supervisor Level password will be supplied as necessary or will already be known by the person performing the changes to the controller.

MARK II MENU STRUCTURE

MAIN DISPLAY HOME

METER INCOMING AC POWER LINE VOLTAGE
ENGINE RUN TIME
BATTERY VOLTS/AMPS
- DETAIL -
SEE FIGURE A
PAGE 7

MENU **EVENT LOG** 3000 EVENTS
- DETAIL -
SEE FIGURE B
PAGE 8

MENU **CLOCK SET** SET TIME/DATE
DAYLIGHT SAVING TIME
- DETAIL -
SEE FIGURE G
PAGE 13

MENU **DATA LOG**
- DETAIL -
SEE FIGURE C
PAGE 9

CALLS/STARTS
TOTAL ENGINE RUN TIME
LAST ENGINE RUN TIME
LAST ENGINE START
LAST HIGH WATER TEMPERATURE
LAST LOW OIL PRESSURE
LAST LOW FUEL LEVEL
LAST CHARGER FAILURE
LAST BATTERY TROUBLE
LAST ENGINE OVERSPEED
MINIMUM BATTERY VOLTAGES
MAXIMUM BATTERY VOLTAGES
TOTAL UNIT RUN TIME
MIN/MAX SYSTEM PRESSURE

MENU **DIAGNOSTICS**
- DETAIL -
SEE FIGURE H
PAGE 14

SOFTWARE VERSION
LAMP TEST
INPUTS 1-16
INPUTS 17-32
OUTPUTS 1-12
OUTPUTS 13-24
KEYPAD DRIVEN OUTPUT
KEYPAD TEST
SERIAL LOOPBACK TEST

MENU **PRINT MENU** PRINT SETTINGS
PRINT DATA LOG
PRINT EVENT LOG
- DETAIL -
SEE FIGURE D
PAGE 10

MENU **SYSTEM SETUP**
- DETAIL -
SEE FIGURE I
PAGE 15

MODEL NUMBER
OPTION CONFIGURATION
USER I/O SETTINGS
BATTERY VOLTAGE/TYPE
SERIAL NUMBER
PRINTER INSTALLED
DISK INSTALLED
CLEAR EVENT LOG
CLEAR DATA LOG
CHANGE PASSWORDS

MENU **PRESSURE SETTINGS**
- DETAIL -
SEE FIGURE E
PAGE 11

START PRESSURE
STOP PRESSURE
PRESSURE RECORDING
MANUAL STOP ONLY
PRESSURE UNITS
LOW SUCTION/LEVEL
ZERO CALIBRATION
SPAN CALIBRATION

MENU **TIMERS** ON-DELAY
MINIMUM RUN
OFF DELAY
WEEKLY TEST
AC POWER LOSS START
- DETAIL -
SEE FIGURE F
PAGE 12

NOTE:
THE MENU STRUCTURE SHOW HERE AND THE
CORRESPONDING DETAIL FIGURE DRAWINGS ARE SUPPLIED
AS A VISUAL REFERENCE ONLY. FOR DETAILED PROGRAMMING
INSTRUCTIONS PLEASE REFER TO THE PROGRAMMING
SECTION OF THIS MANUAL



MARK II MENU STRUCTURE

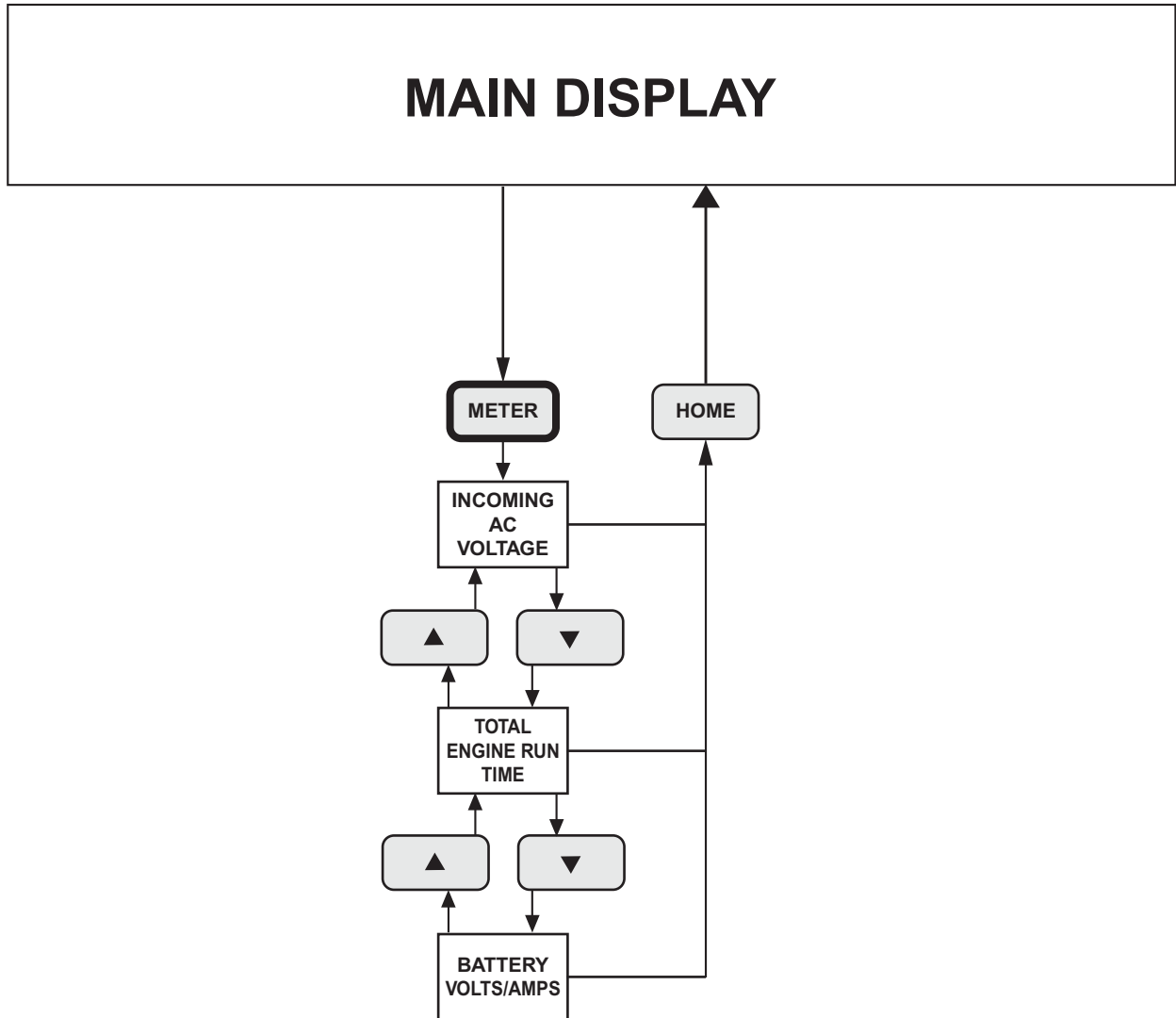


FIGURE A

MARK II MENU STRUCTURE

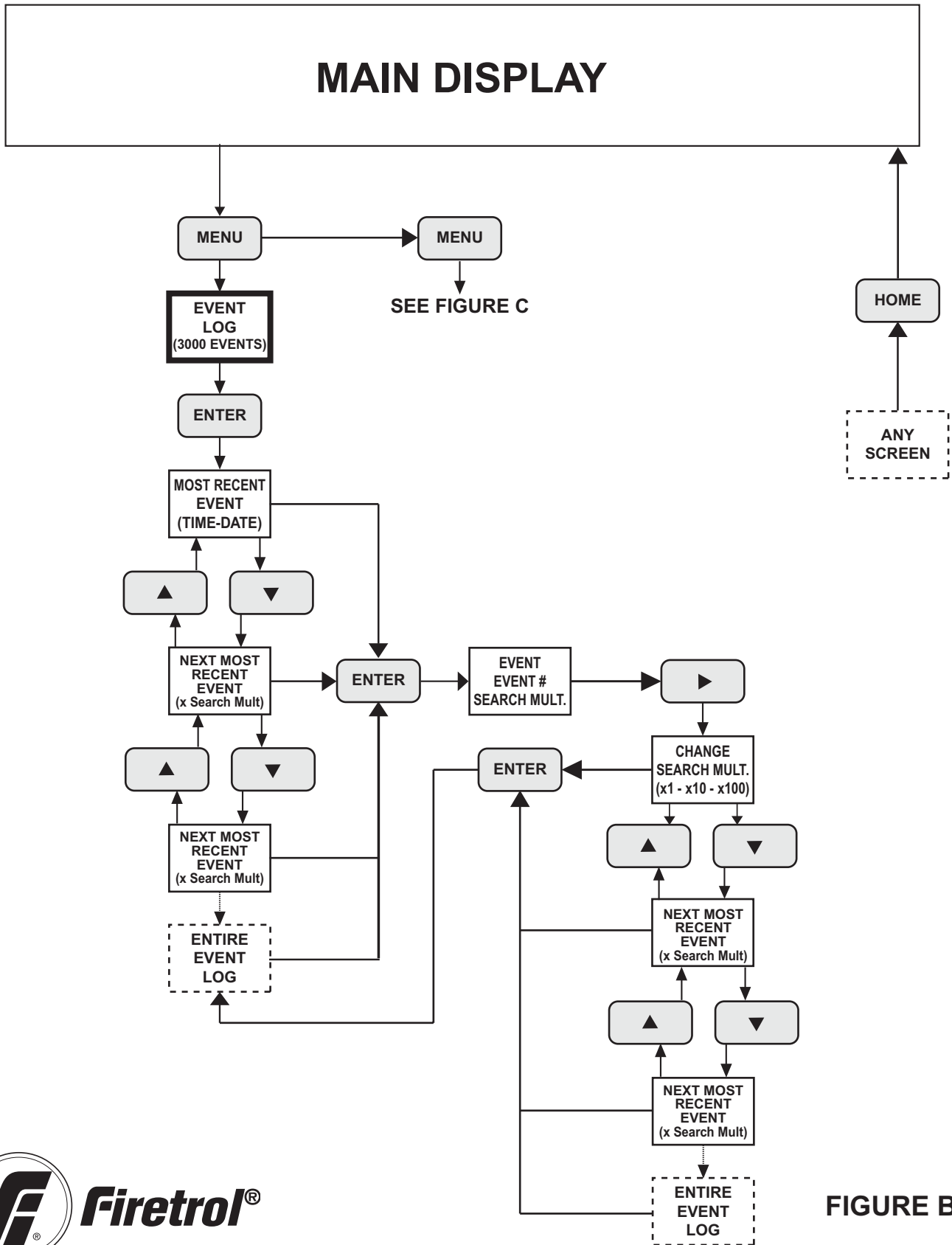


FIGURE B



MARK II MENU STRUCTURE

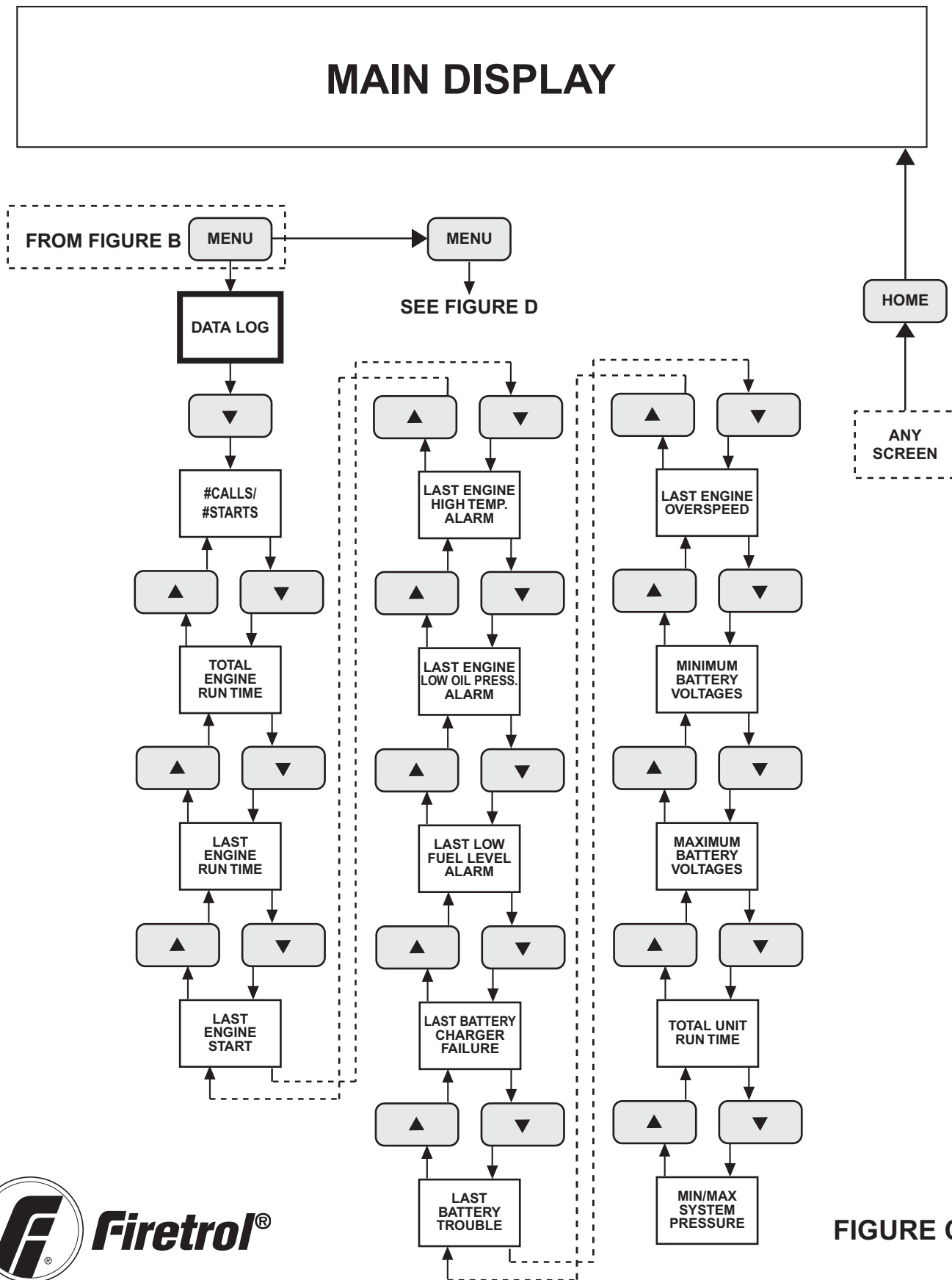


FIGURE C

MARK II MENU STRUCTURE

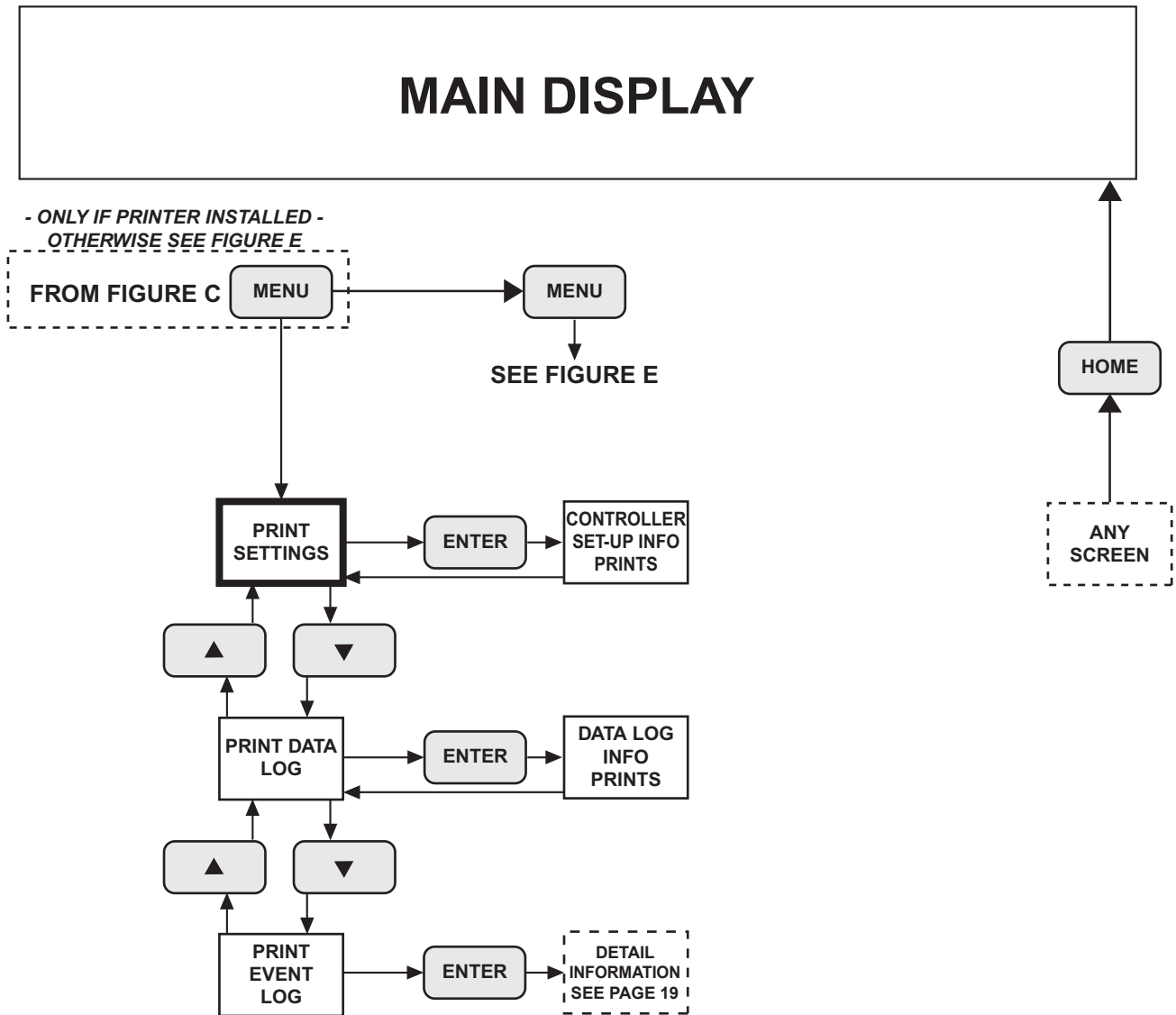


FIGURE D

MARK II MENU STRUCTURE

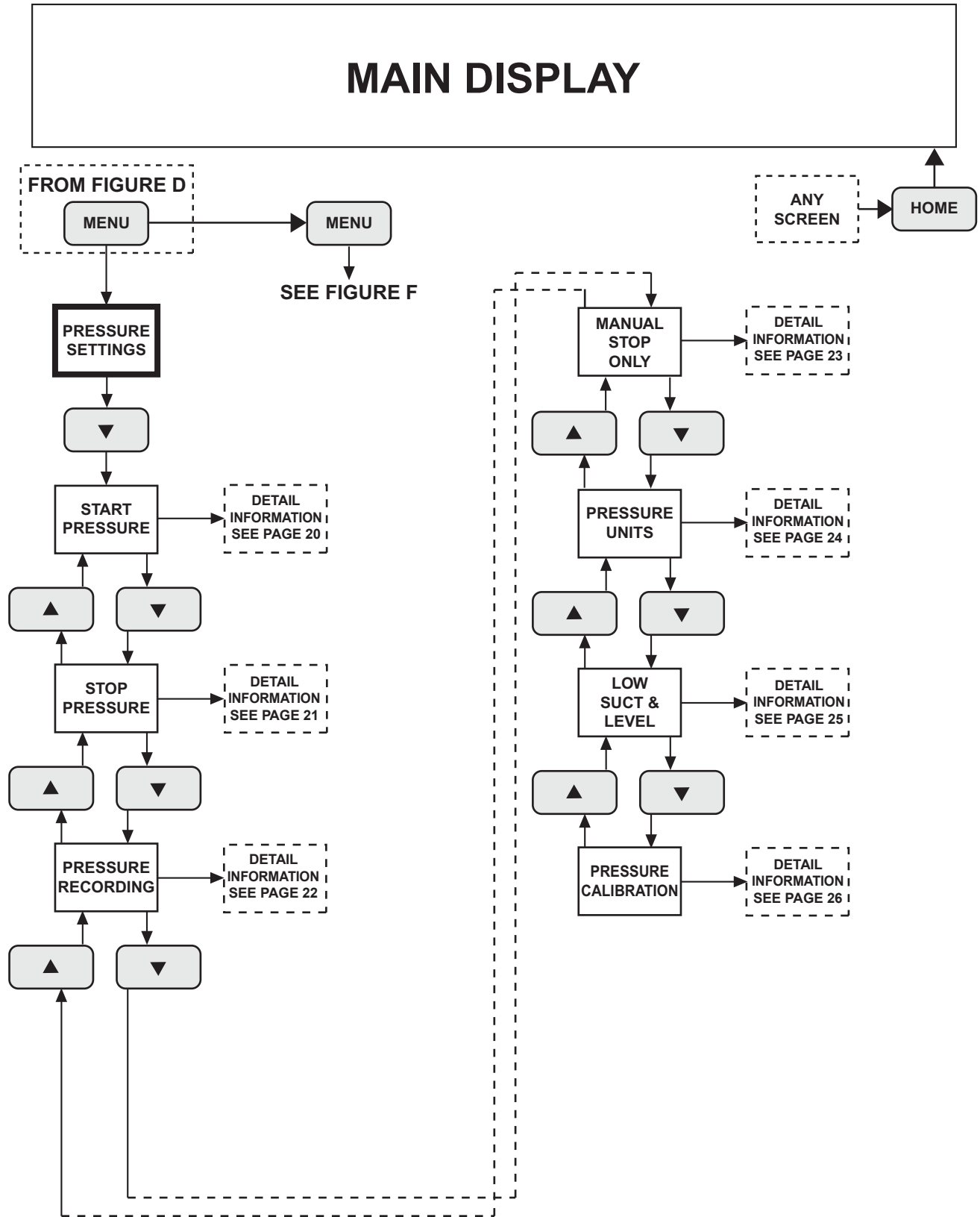


FIGURE E

MARK II MENU STRUCTURE

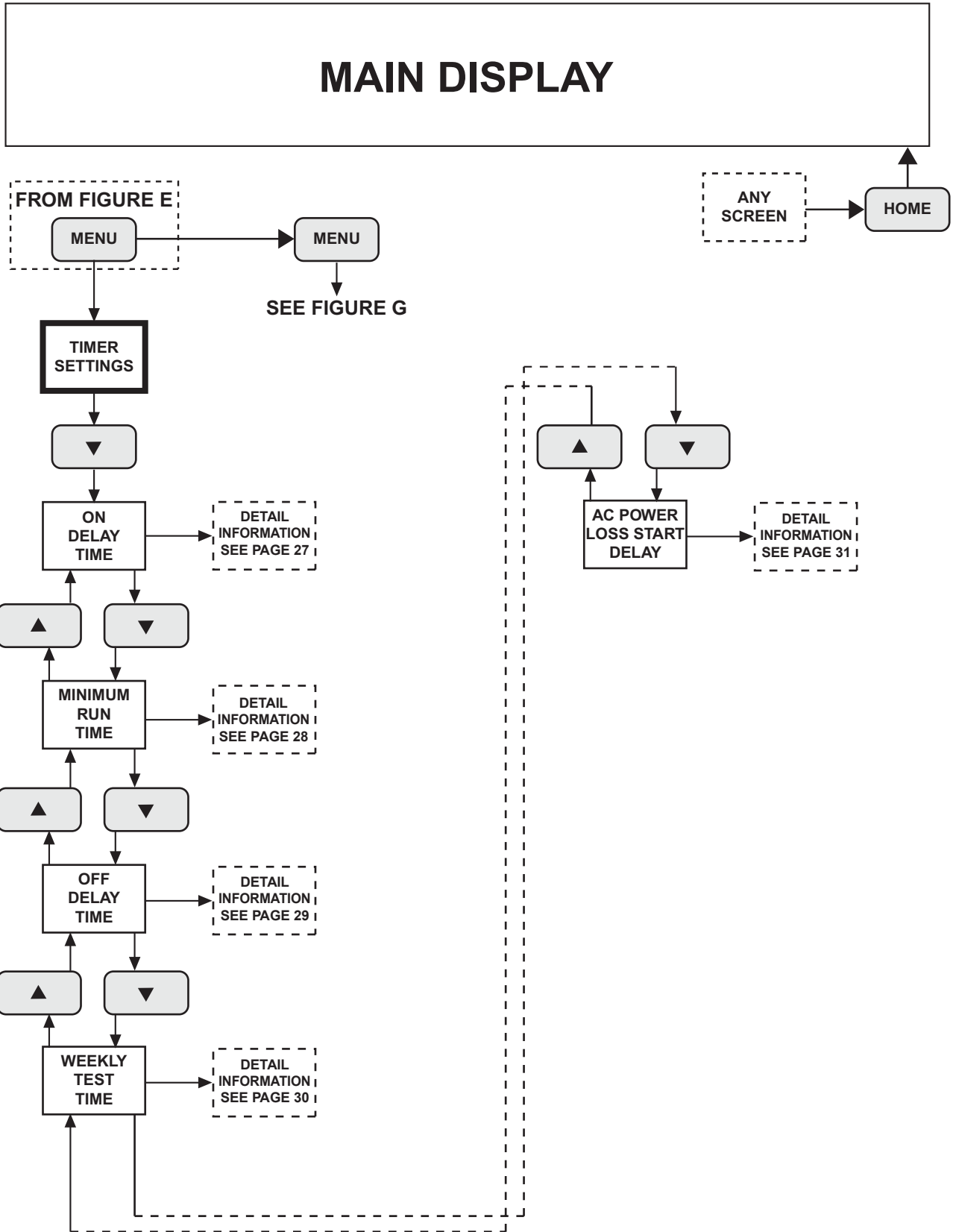
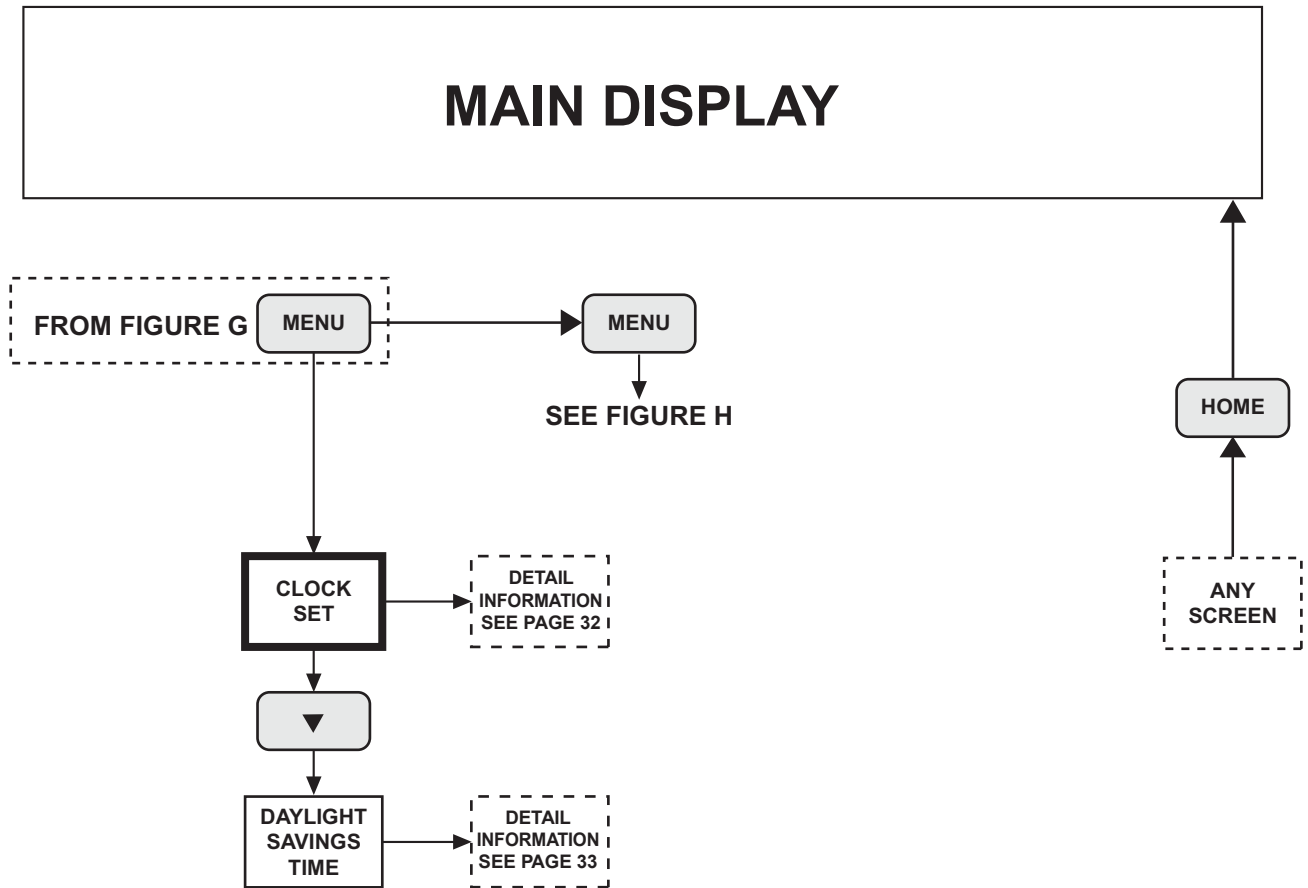


FIGURE F



MARK II MENU STRUCTURE



MARK II MENU STRUCTURE

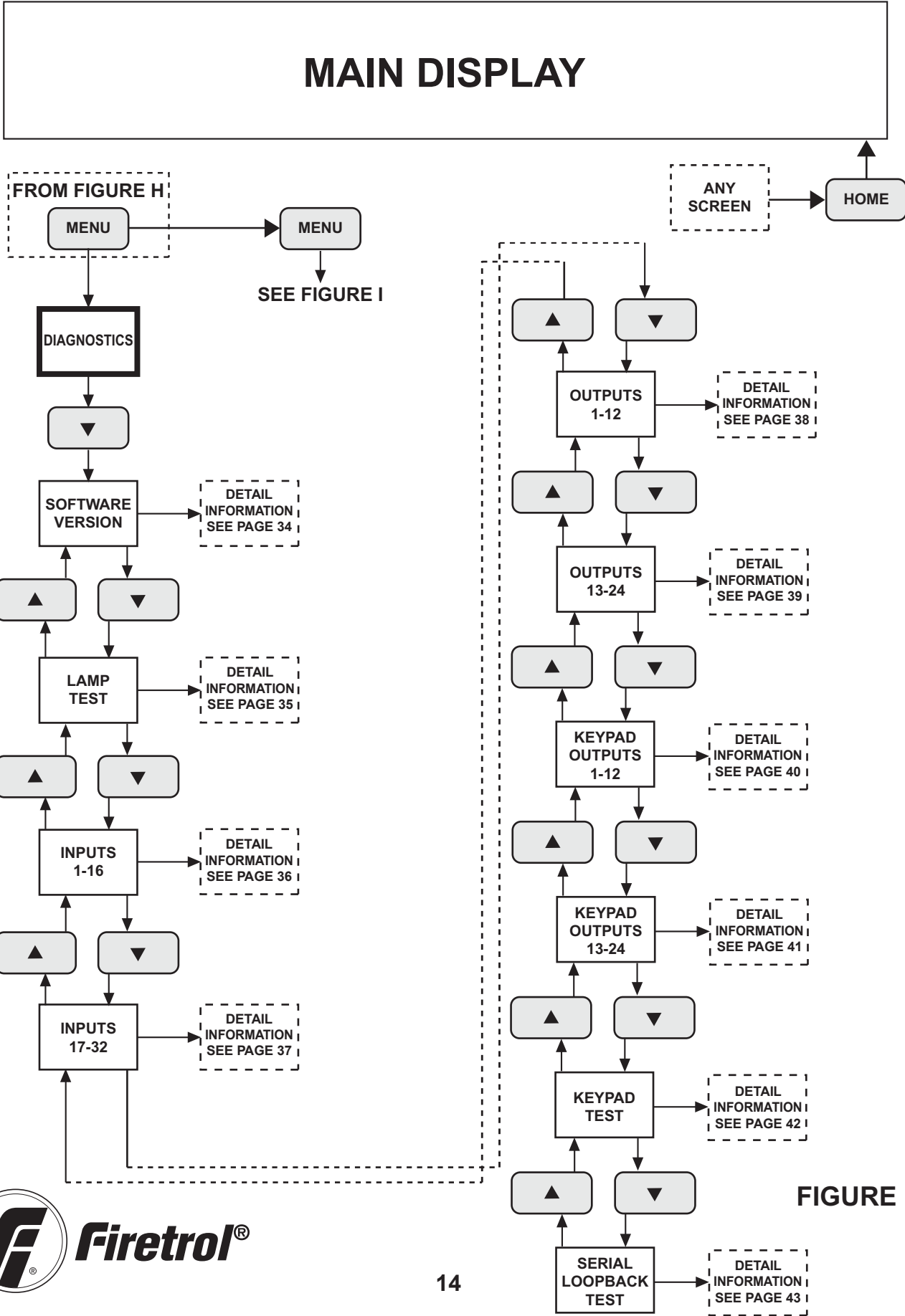


FIGURE H



MARK II MENU STRUCTURE

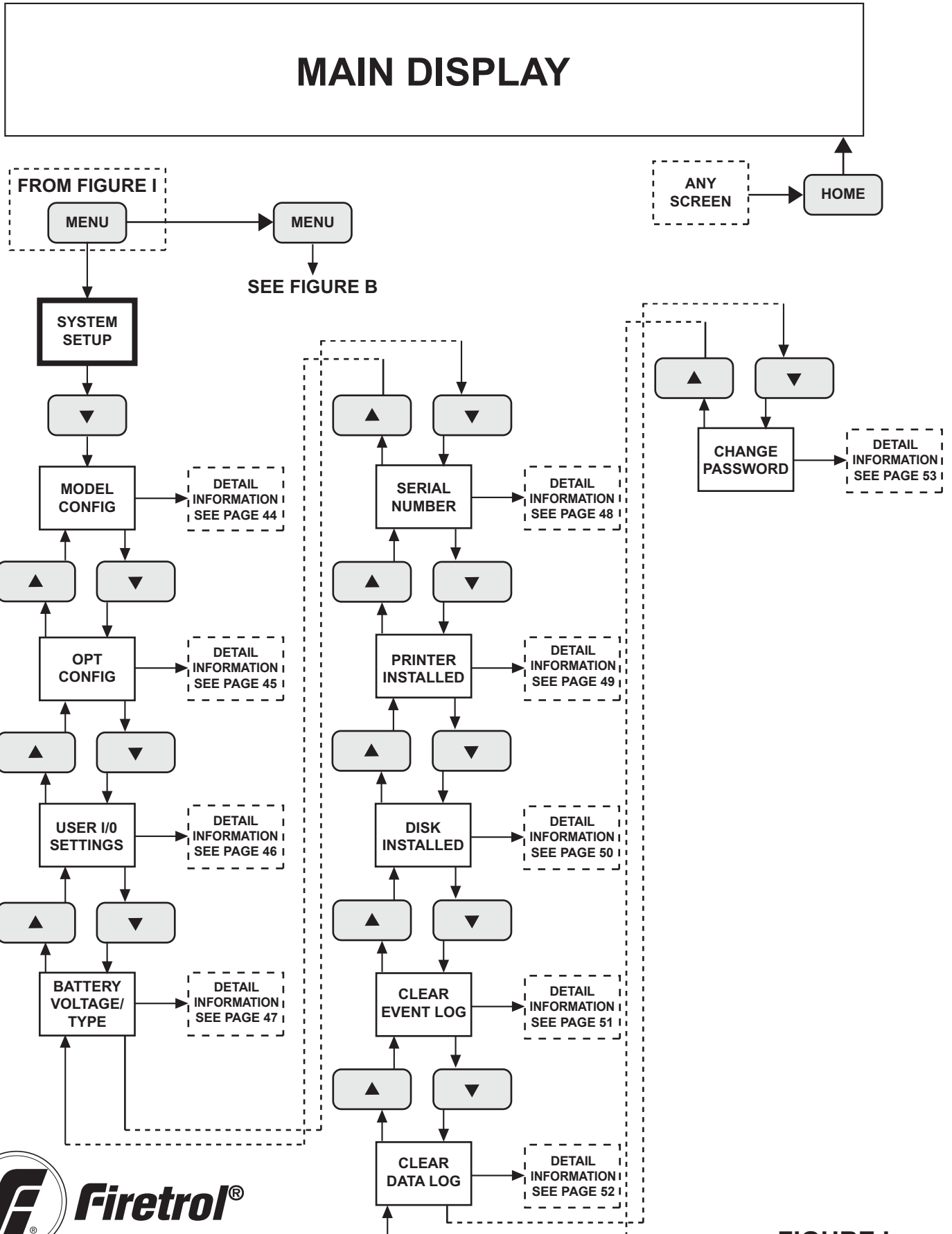
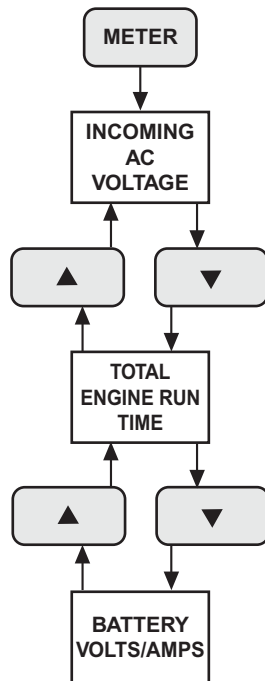


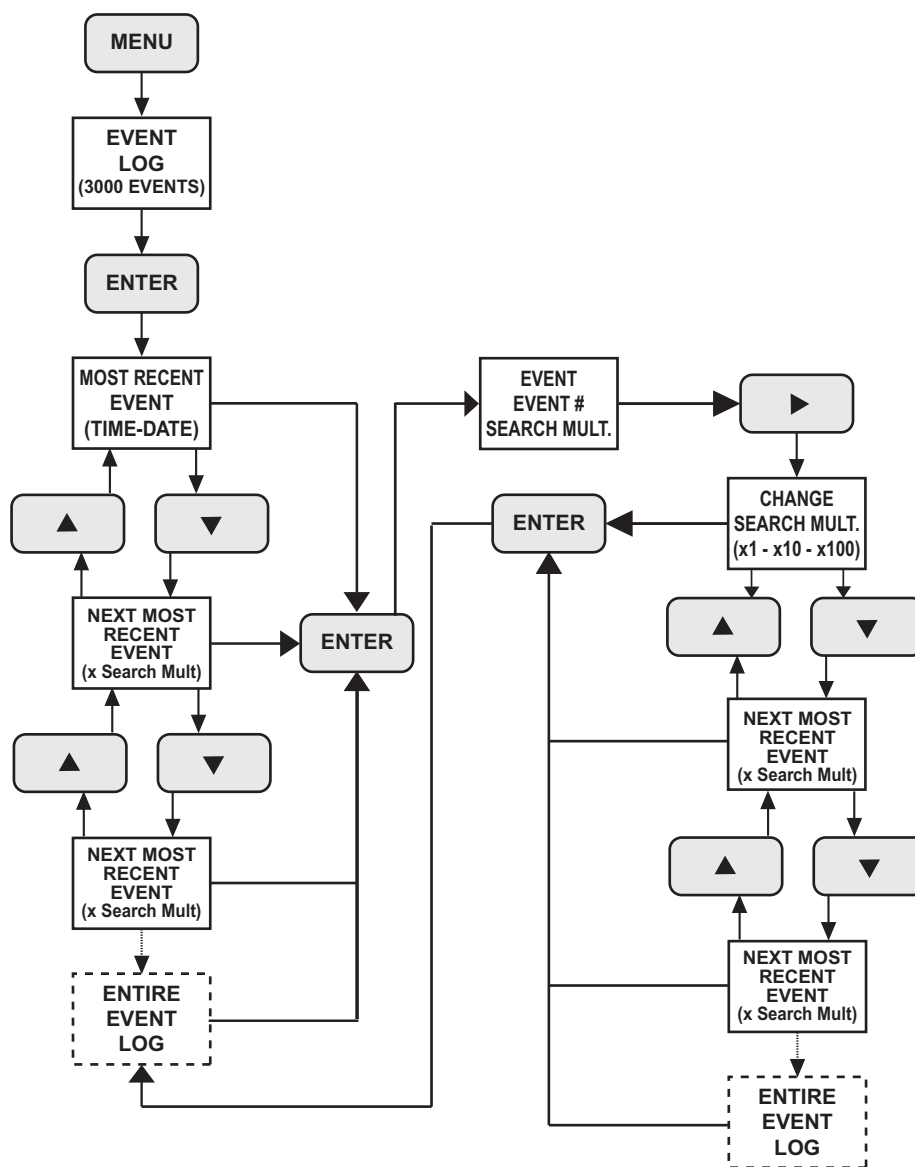
FIGURE I

METER



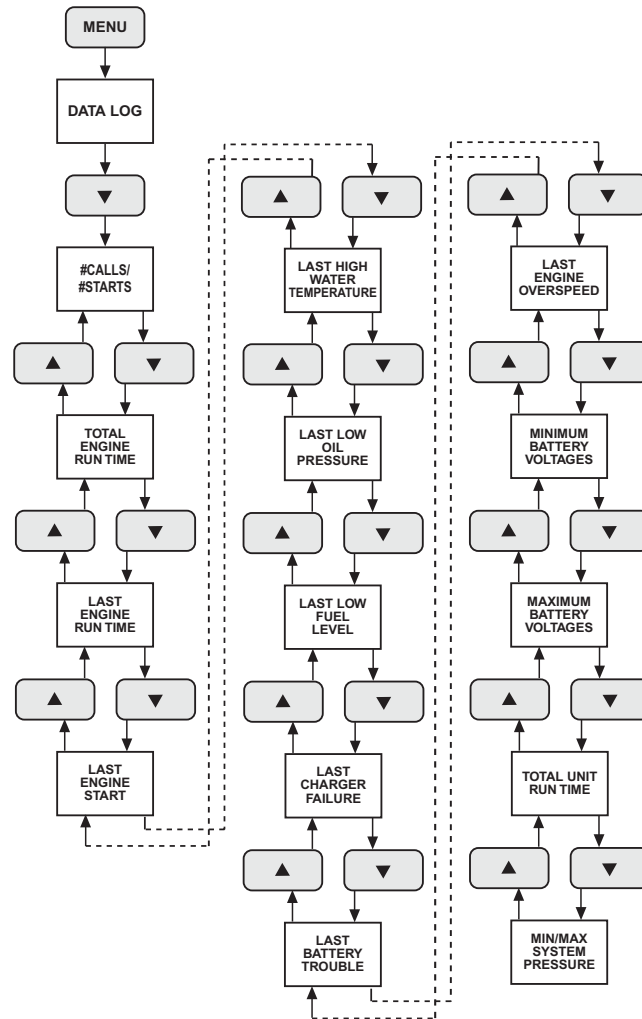
When the METER button is pushed, the display will show existing voltage for incoming AC power lines. Use the ▼ key to scroll to the next set of values, which is the total engine run time. Pressing the ▼ key again will display the existing voltage and charging rate for each battery. You may use the ▲ key to scroll back through the various values. Press HOME to return to the main screen.

EVENT LOG



The controller keeps an internal log of all events. This memory log stores the last 3000 events in chronological order. To view the event log, press MENU. The display will show “Event Log”. Press ENTER. The most recent event will be shown with a time/date stamp. To view the previous event, press the ▼ key. The ▲ and ▼ keys can be used to scroll forward and backward through the events. To search more rapidly through the events, such as looking for a specific date, press the ENTER key while viewing any event. The event will appear on the top line of the display. The event number and search multiplier {X1, X10, X100} will appear on the bottom line of the display. To change the search multiplier, press the ▶ key. The search multiplier determines how many events are skipped when the ▲ and ▼ keys are used. Press ENTER to return to the event screen with time/date stamp or you can scroll through the events from the current screen. Press HOME to return to the main screen when finished viewing events.

DATA LOG

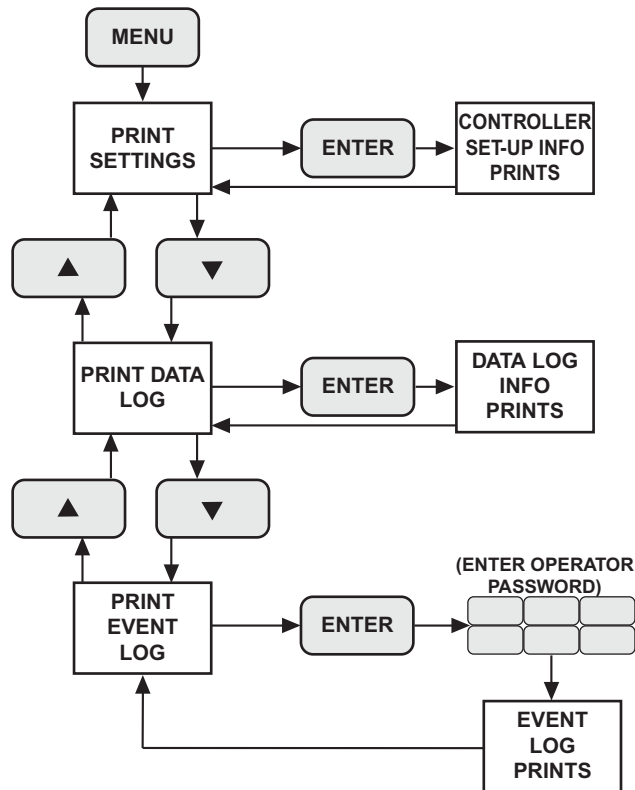


The controller keeps an internal log of historical data. This log consists of the following data:

- No. of calls to start / No. of actual starts
- Total Engine Run Time (Hrs:Min:Sec)
- Last Engine Run Time (Min:Sec)
- Last Engine Start (Time and Date)
- Last High Water Temperature (Time and Date)
- Last Low Oil Pressure (Time and Date)
- Last Low Fuel Level (Time and Date)
- Last Battery Charger Failure (Time and Date)
- Last Battery Trouble (Time and Date)
- Last Engine Overspeed (Time and Date)
- Minimum Battery Voltages
- Maximum Battery Voltages
- Total Unit Run Time
- Min/Max System Pressure

To view the data log, press MENU until “Data Log” appears on the screen. Use the ▲ and ▼ keys to scroll through the data log information. Press HOME to return to the main screen when finished viewing the data log.

PRINT MENU (if printer installed)



Press MENU until “Print Menu” is displayed. Press ENTER. Use the ▲ and ▼ keys to scroll through the print menu choices. The available choices are “Print Settings”, “Print Data Log” and “Print Event Log”. Due to the size of the Event Log, you will be prompted to enter the *operator* level password prior to printing. Press ENTER to print the desired information. Press HOME to return to the main screen. Information given is as follows:

Settings-

Information is printed on the controller setup for the following items:

Model Number • Serial Number • Software Version • Battery Voltage/Type • Printer Installed • Disk Installed • Option Configuration • User I/O Settings • Start Pressure • Stop Pressure • Pressure Recording • Manual Stop Only • Pressure Units • On Delay Time • Minimum Run Time • Off Delay Time • Weekly Test • AC Power Loss Start • Under Voltage

Data Log-

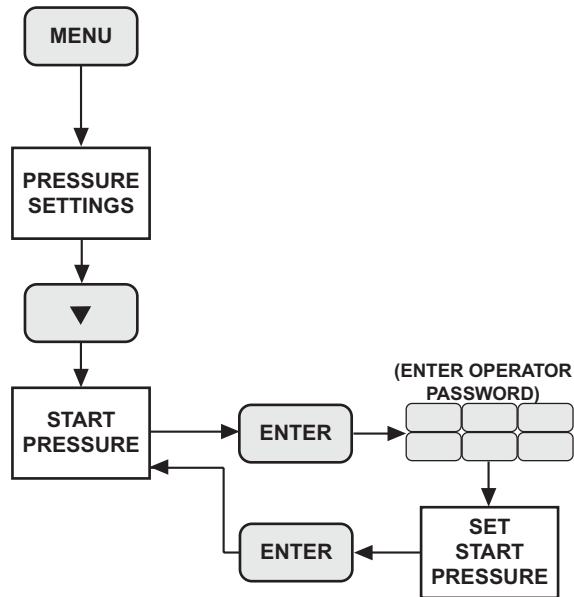
Following information is contained in the Data Log:

No. of calls to start / No. of actual starts • Total Engine Run Time (Hrs:Min) • Last Engine Start Time (Time and Date) • Last High Water Temp (Time and Date) • Last Low Oil Pressure (Time and Date) • Last Low Fuel Level (Time and Date) • Last Charger Failure (Time and Date) • Last Battery Trouble (Time and Date) • Last Engine Overspeed (Time and Date) • Minimum Battery Voltages • Maximum Battery Voltages • Total Unit Run Time (Power On Time - Hrs:Min) • Min/Max Pressure

Event Log-

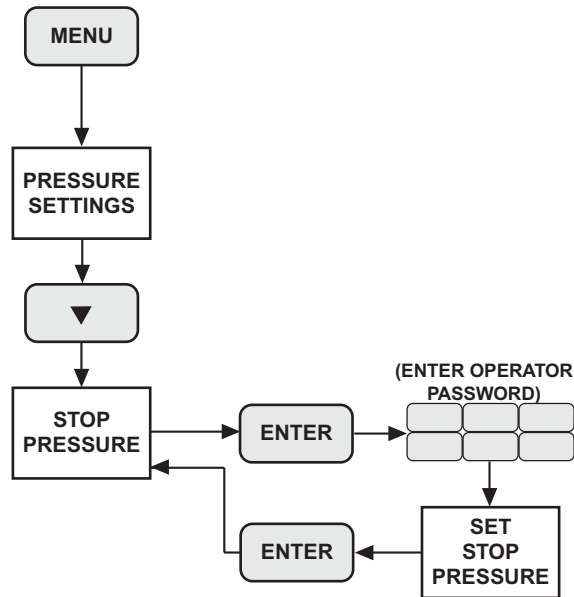
The Event Log contains a chronological record of the last 3000 events.

PRESSURE SETTINGS - START PRESSURE



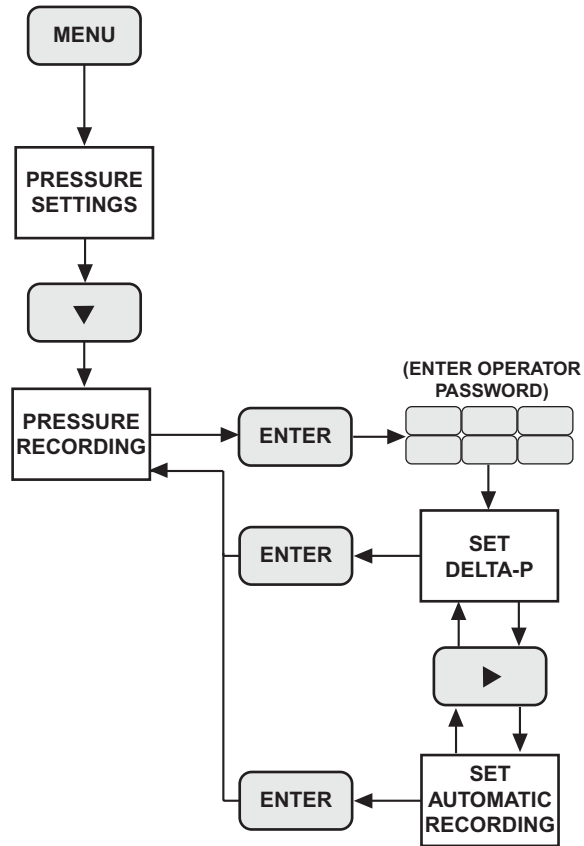
Press MENU button until “Pressure Settings” appears on the display. Press ENTER. Present start pressure setting will be displayed. To change the pressure setting, press ENTER. Enter the *operator* password. Use the ▲ and ▼ keys to set start pressure to desired setting. Press ENTER to store the new setting. Press HOME to return to the main screen. (Note: The minimum operating pressure differential (the difference between the START and STOP settings) is 5 psi. If start pressure cannot be raised it is because the pressure is at the 5 psi differential. Raise the STOP pressure to allow additional differential to raise the START pressure).

PRESSURE SETTINGS - STOP PRESSURE



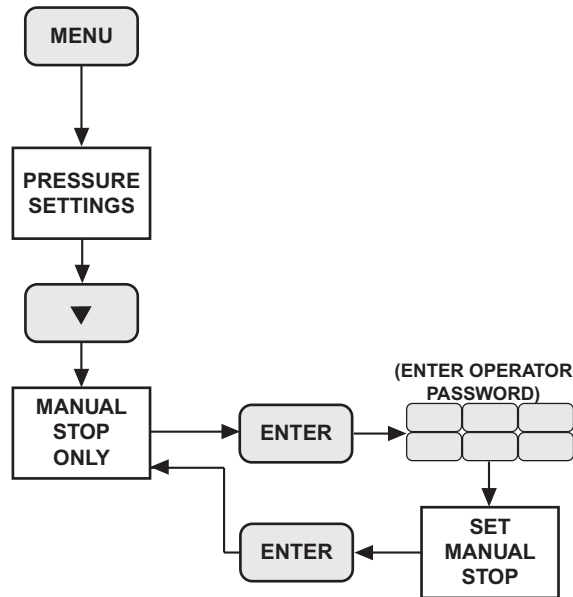
Press MENU button until “Pressure Settings” appears on the display. Use the ▼ key to scroll to the stop pressure setting. The current set point will be displayed. To change the pressure setting, press ENTER. Enter the *operator* password. Use the ▲ and ▼ keys to set stop pressure to desired setting. Press ENTER to store the new setting. Press HOME to return to the main screen. (Note: The STOP pressure setting must be set at a pressure less than the fire pump “churn” pressure (Including minimum suction pressure) otherwise, the pump will run continuously once started).

PRESSURE SETTINGS - PRESSURE RECORDING



The pressure recording settings determine when the system pressure is recorded. This information is saved to the built in event log, and the floppy disk. This information will also be printed if the controller was ordered with a printer. To set these parameters, press the MENU button until "Pressure Settings" appears on the display. Use the ▼ key to scroll to the "Pressure Recording" screen. The present settings will be displayed. Press ENTER to change the settings. Enter the *operator* password. The cursor will blink next to the "Delta p" (ΔP) setting. This setting refers to a variation in pressure. If the pressure deviates +/- more than the setting, the event is recorded. Use the ▲ and ▼ keys to set the "delta p" setting. The parameters for this setting are "OFF" or a pressure setting from 5 to 50 psi. Next to the "delta p" setting is the automatic recording setting. This setting can be set to "Off" or "Hourly". To change this setting use the ▶ key to move the cursor and the ▲ or ▼ keys to change the setting. Press ENTER to store the new settings. Press HOME to return to the main screen.

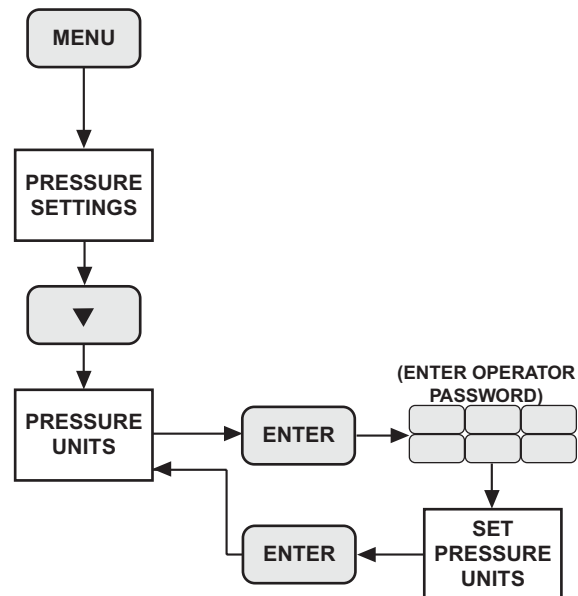
PRESSURE SETTINGS - MANUAL STOP ONLY



The controller can be set for manual stop only. This setting can be either “Enabled” or “Disabled”. Enabling this setting will cause the Mark II to ignore any minimum run or off delay timer settings. The minimum run or off delay timers will appear on the display and count down the set times, but the controller will not stop the pump at the end of this time. The only way to stop the pump with the manual stop only setting enabled is to press the STOP push-button. If system pressure is low, the pump will restart when the STOP push-button is released.

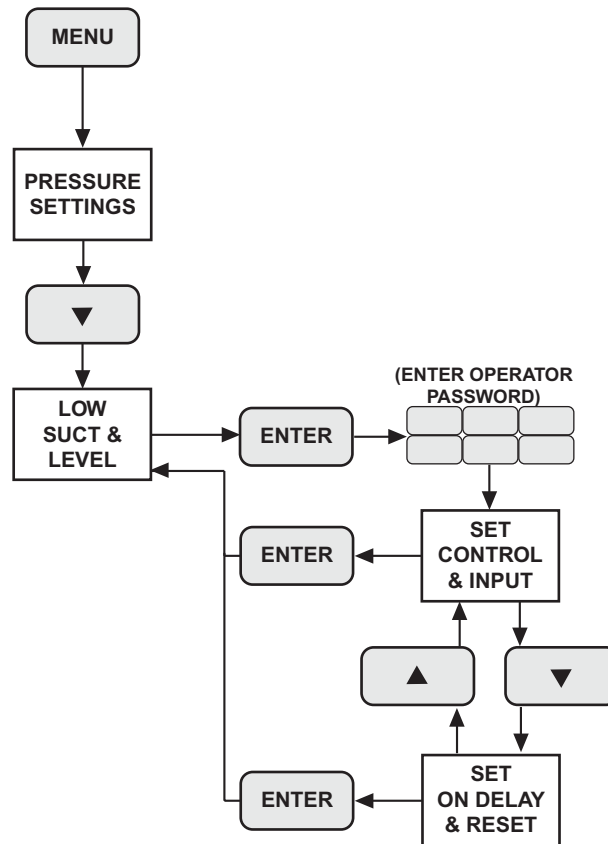
To set this parameter press MENU button until “pressure settings” appears on the display. Use the ▼ key to scroll to the “Manual Stop Only” setting. The set value will be displayed. Press ENTER to change the setting. Enter *operator* password. Use the ▲ or ▼ keys to toggle the setting. Press ENTER to store the setting. Press HOME to return to the main screen.

PRESSURE SETTINGS - PRESSURE UNITS



The Mark II can display pressure in either “psi” or “bar”. To change this setting, press MENU until “Pressure Settings” appears on the display. Use the ▼ key to scroll to the “Pressure Units” setting. The existing setting will be displayed. Press ENTER to change the setting. Enter *operator* password. Use the ▲ or ▼ keys to toggle the setting. Press ENTER to store the setting. Press HOME to return to main screen.

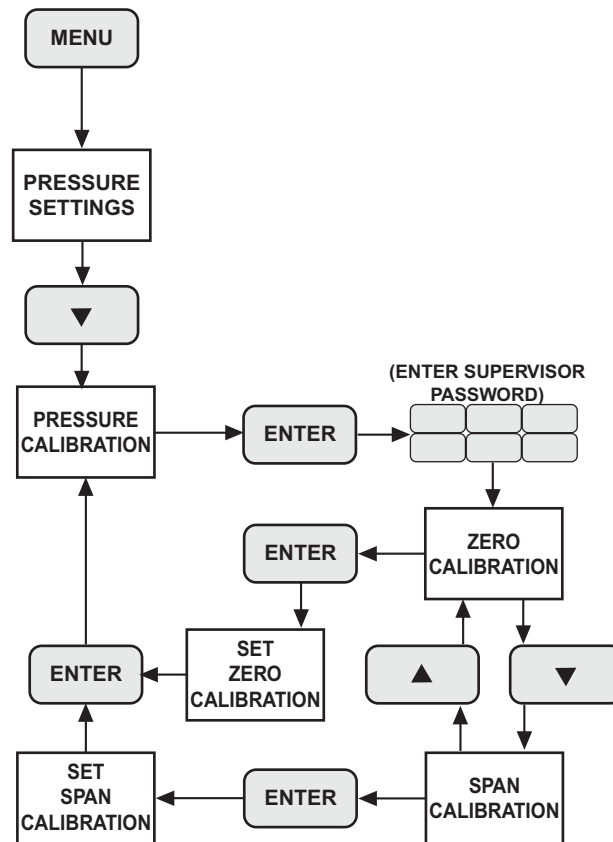
PRESSURE SETTINGS - LOW SUCTION & LEVEL



These settings provide for alarm or shutdown if there is a problem with the water supply to the pump. Depending on settings, the controller will display “Low Suction Pressure” or “Reservoir Low” if one of these conditions occur.

Press MENU until “Pressure Settings” is displayed. Use the ▼ key to scroll to the “Low Suction & Level” setting. To change, press ENTER and enter the *operator* password. The settings for “control” and “input” will be displayed. To modify the settings, press ENTER. The cursor will flash next to the “control” setting. Use the ▲ and ▼ keys to set the desired control method (Off, Alarm or Shutdown). Use the ► key to move the cursor to the “Input” setting. Use the ▲ and ▼ keys to set the desired input (Level or Suction). Press ENTER to store the new setting. Use the ▼ key to see the current settings for “On Delay” and “Reset”. Press ENTER to change these settings. Use the ▲ and ▼ keys to set the desired delay time (5 - 60 seconds). Use the ► key to move the cursor to the “reset” setting. Use the ▲ and ▼ keys to set the desired reset method (Auto or Manual). Press ENTER to store the new setting. (Note: Manual Reset will only be available if the controller was ordered with the manual reset option). Press HOME to return to the main screen.

PRESSURE SETTINGS - PRESSURE CALIBRATION



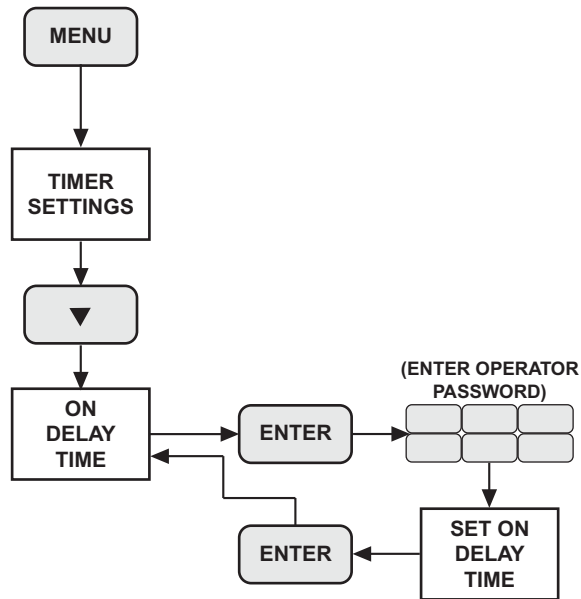
(Note: Pressure is calibrated at the factory. Firetrol does not recommend calibration by building service or maintenance personnel. Improper calibration could lead to a failure of the fire pump controller to properly react to changes in system pressure.)

Press MENU until “Pressure Settings” appears on the display. Use the ▼ key to scroll to the “Calibration” setting. Press ENTER to continue. Enter *supervisor* password. Press ENTER to calibrate the Zero setting or press the ▼ key to go to the Span setting, press ENTER to calibrate the span setting.

Zero Calibration - Display will read “Set Transducer Input to Zero Pressure”. Remove system pressure from the sensing line. When pressure has been removed, press ENTER. Display will read “Set Zero Pressure” ZP=0. Use the ▲ and ▼ keys to set a minimum pressure if zero pressure cannot be obtained. Press ENTER to store the setting. Press ENTER to exit. Press HOME to return to the main screen.

Span Calibration - Display will read “Set Transducer Input to Span Pressure”. Set system pressure to a known pressure using a calibrated gauge or other accurate pressure measuring device. Press ENTER. Display will read “Set Span Pressure” SP=100. Use the ▲ and ▼ keys to set the pressure to match the reading on calibrated gauge or other accurate device. Press ENTER to store the setting. Press ENTER to exit. Press HOME to return to the main screen.

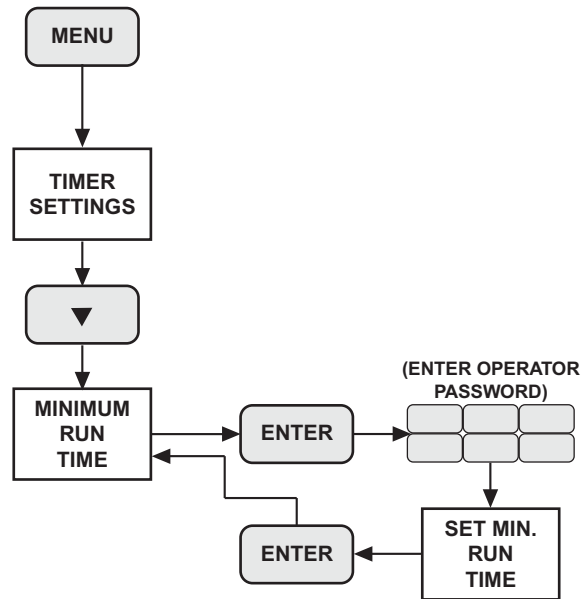
TIMERS - ON DELAY TIME



Also known as sequential start time, this setting determines the amount of time the controller waits to start the engine when a starting cause is present.

Press MENU until “Timers” is displayed. The current setting will be displayed, to change the setting press ENTER. Enter *operator* password. The cursor will flash next to the timer setting. Use the ▲ and ▼ keys to set the desired on delay time (timer range is 0 - 60 seconds). Press ENTER to store the new setting. Press HOME to return to the main screen.

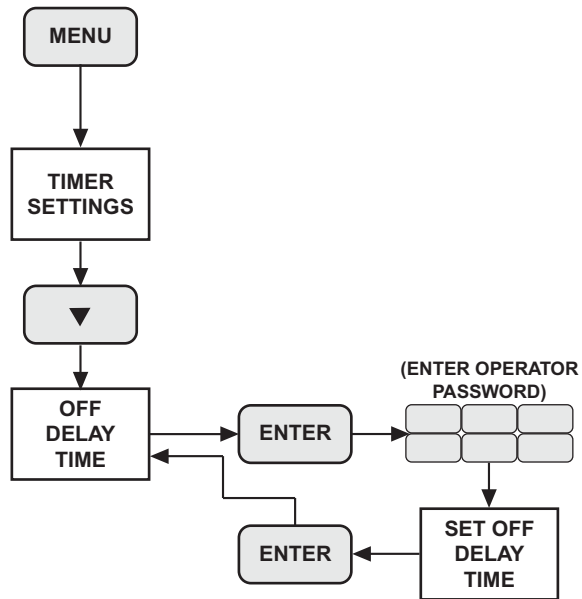
TIMERS - MINIMUM RUN TIME



This setting determines the length of time the engine runs once started. The default setting is 30 minutes. The controller will stop the engine after this timer expires, providing all starting causes have been satisfied.

Press MENU until “Timers” is displayed. Use the ▼ key to scroll to the “Min Run Time” setting. The current value will be displayed. To change, press ENTER and enter the *operator* password. The cursor will flash next to the timer setting. Use the ▲ and ▼ keys to set the desired minimum run time (timer range is 0 - 60 minutes). Press ENTER to store the new setting. Press HOME to return to the main screen.

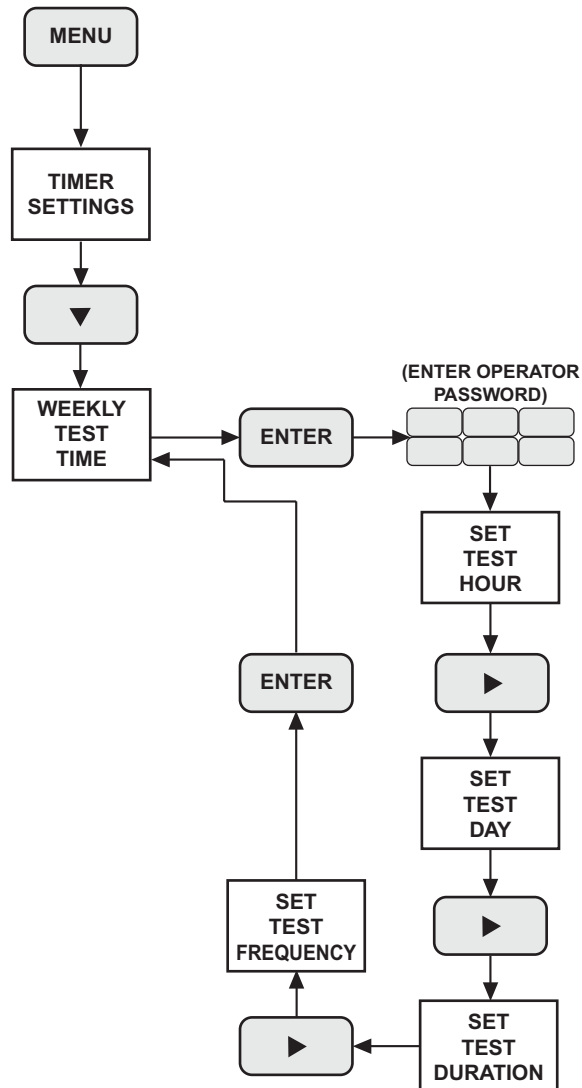
TIMERS - OFF DELAY TIME



This setting determines the length of time the engine runs after the starting cause is satisfied. The default setting is zero. This timer is in lieu of, not in addition to, the minimum run timer. The minimum run time must be set to zero for the off delay time to be active.

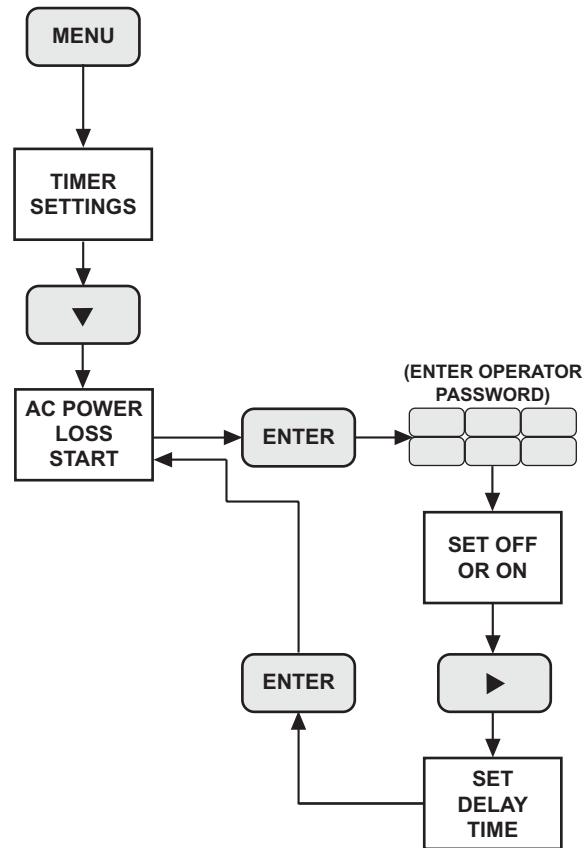
Press MENU until “Timers” is displayed. Use the ▼ key to scroll to the “Off Delay Time” setting. The current value will be displayed. To change, press ENTER and enter the *operator* password. The cursor will flash next to the timer setting. Use the ▲ and ▼ keys to set the desired off delay time (timer range is 0 - 60 minutes). Press ENTER to store the new setting. Press HOME to return to the main screen.

TIMERS - WEEKLY TEST TIME



The controller is supplied with a weekly test timer which will automatically start, exercise the engine and stop. To set the weekly test timer, press MENU until “Timers” is displayed. Use the ▼ key to scroll to the “Weekly Test” setting. The existing setting will be displayed, press ENTER to change the settings. Enter the *operator* password. The cursor will flash on the hour that the test is to start. Use the ▲ and ▼ keys to set the desired hour. Use the ▶ key to advance the cursor to the day setting. Use the ▲ and ▼ keys to set the desired day that the test will occur. Use the ▶ key to advance the cursor to the test duration setting. Use the ▲ and ▼ keys to set the desired length of time to run the engine (timer range is 0 - 60 minutes). Use the ▶ key to advance the cursor to the frequency setting. This setting determines how often the test is performed. Use the ▲ and ▼ keys to set the desired frequency (setting can be 0 thru 4 weeks. 0 = Off (do not run test). 1 = Run test at set day and time every week. 2 = Run test at set day and time every other week. 3 = Run test at set day and time every third week. 4 = Run test at set day and time every 4th week (monthly)). Press ENTER to store the value. Press HOME to return to the main screen.

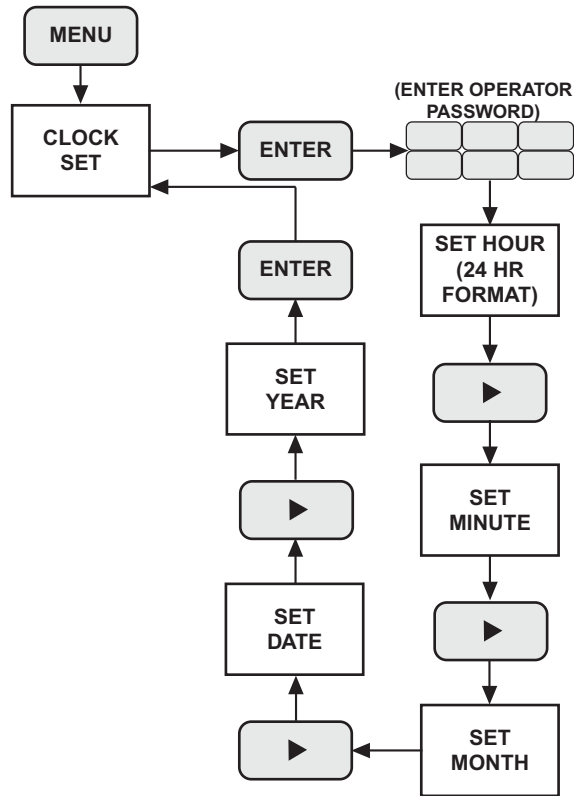
TIMERS - AC POWER LOSS START



The controller is supplied with an AC power loss start (delay) timer which will automatically start the engine in the event of an AC power failure. This will allow the engine alternator to charge the batteries since the controllers' chargers require AC power to operate. The engine will run for the set minimum run time if power is restored or engine will run until power is restored if outage is longer than the minimum run time.

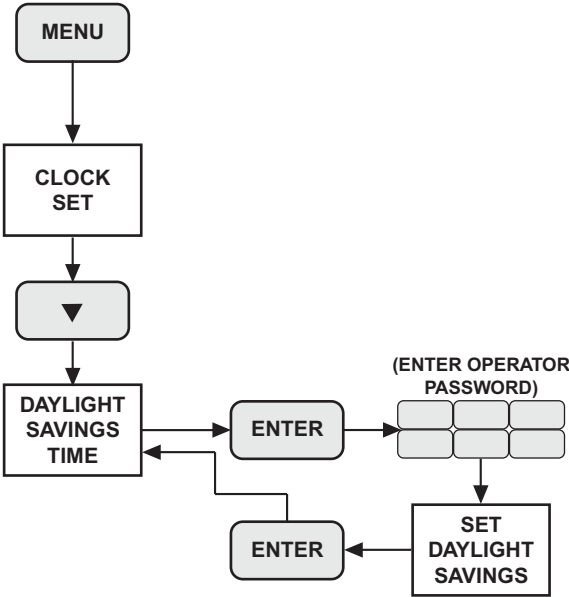
To set the AC power loss start, press MENU until "Timers" is displayed. Use the ▼ key to scroll to the "AC Power Loss Start" setting. The existing settings will be displayed, press ENTER to change the settings. Enter the *operator* password. The cursor will flash on the "Off or On" setting. Use the ▲ and ▼ keys to turn this feature on or off. Use the ▶ key to advance the cursor to the delay setting. Use the ▲ and ▼ keys to set the desired delay time which the controller will wait to start the engine following the outage. This range is 5 - 300 seconds. Press ENTER to store the settings. Press HOME to return to the main screen.

CLOCK SET



Press MENU button until “Clock Set” appears on the display. Press the ENTER key to change the settings. Enter the *operator* password. The time and date will appear with a flashing cursor over the hour (hour is in 24 hour format). Use the ▲ and ▼ keys to set the current hour. Use the ▶ key to move the cursor to the minute setting. Use the ▲ and ▼ keys to set the current minute. Use the ▶ key to move the cursor to the month setting. Use the ▲ and ▼ keys to set the current month. Use the ▶ key to move the cursor to the date setting. Use the ▲ and ▼ keys to set the current date. Use the ▶ key to move the cursor to the year setting. Use the ▲ and ▼ keys to set the current year. When settings are satisfactory, press ENTER to return to the main screen.

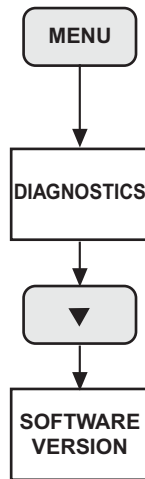
CLOCK SET - DAYLIGHT SAVINGS TIME



The Mark II can automatically adjust the clock for daylight savings time. If this setting is set to “enable” the time will automatically reset ahead 1 hour at 2 am on the first Sunday in April and reset back 1 hour at 2 am on the last Sunday in October.

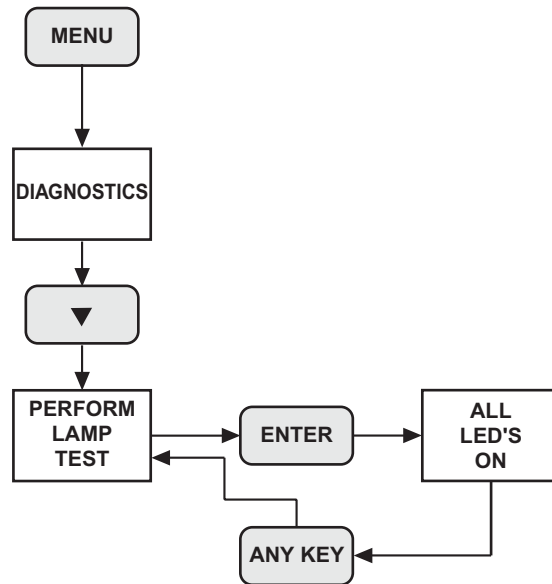
Press MENU button until “Clock Set” appears on the display. Use the ▼ key to scroll to the “Daylight Savings” screen. Press the ENTER key to change the settings. Enter the *operator* password. Use the ▲ and ▼ keys to enable or disable this setting. Press ENTER to store the new setting. Press HOME to return to the main menu.

DIAGNOSTICS - SOFTWARE VERSION



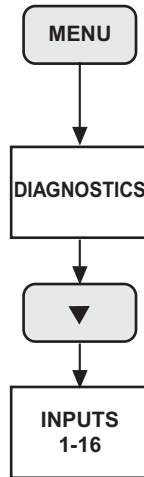
To view the loaded software version press MENU until the “Diagnostics” screen appears. Use the ▼ key to scroll to the “Software Version” screen. The loaded revision level will be shown. Press HOME to return to the main screen.

DIAGNOSTICS - LAMP TEST



To perform a lamp test, press MENU until the “Diagnostics” screen appears. Use the ▼ key to scroll to the “Perform Lamp Test” screen. Press ENTER to perform the test. All Mark II LED’s should illuminate. Press any key to end the test. Press HOME to return to the main screen.

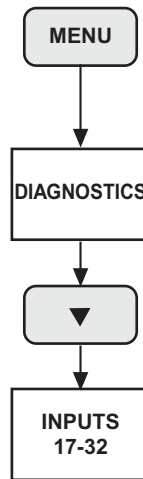
DIAGNOSTICS - DISCRETE INPUTS 1-16



To view inputs (1-16) to the Mark II press MENU until the “Diagnostics” screen appears. Use the ▼ key to scroll to the “Discrete Inputs 1-16” screen. This screen displays the status of the first 16 inputs to the Mark II. A zero designates no input, a 1 indicates an input is present. Not all inputs are used on all controllers. The inputs read from left to right and are designated as follows:

- | | |
|----------------------------------|--------------------------------|
| 1 - User 1 (Auto Pressure Start) | 2 - User 2 (Flow Meter On) |
| 3 - User 3 (Fuel Spill) | 4 - User 4 (Series Pumping In) |
| 5 - User 5 (Low Suct. Press. In) | 6 - User 6 |
| 7 - User 7 | 8 - User 8 |
| 9 - CPU Tester Profile | 10 - Crank On Battery 1 |
| 11 - Crank On Battery 2 | 12 - Manual Stop |
| 13 - Manual Mode | 14 - Off Mode |
| 15 - Auto Mode | 16 - Weekly Test Pushbutton |

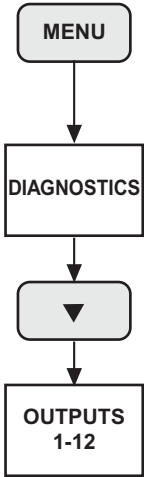
DIAGNOSTICS - DISCRETE INPUTS 17-32



To view inputs (17-32) to the Mark II press MENU until the “Diagnostics” screen appears. Use the ▼ key to scroll to the “Disc. Inputs 17-32” screen. This screen displays the status of inputs 17 - 32 to the Mark II. A zero designates no input, a 1 indicates an input is present. Not all inputs are used on all controllers. The inputs read from left to right and are designated as follows:

- | | |
|--------------------------------|---------------------------------|
| 17 - Remote Start | 18 - Remote Interlock |
| 19 - Deluge Valve Open | 20 - Engine Run |
| 21 - Engine Overspeed | 22 - Engine Temperature High |
| 23 - Engine Oil Pressure Low | 24 - Low System Pressure Switch |
| 25 - Low Fuel Level | 26 - High Fuel Level |
| 27 - Low Pump Room Temperature | 28 - High Reservoir Level |
| 29 - Low Reservoir Level | 30 - Relief Valve Open |
| 31 - Spare | 32 - DC Control Voltage |

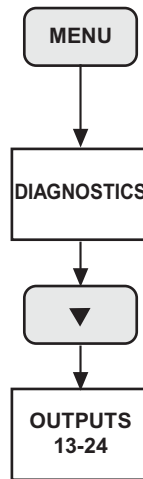
DIAGNOSTICS - DISCRETE OUTPUTS 1-12



To view outputs from the Mark II press MENU until the “Diagnostics” screen appears. Use the ▼ key to scroll to the “Disc. Outputs 1-12” screen. This screen displays the status of outputs 1-12 from the Mark II. A zero designates no output, a 1 indicates an output is present. Not all outputs may be used on all controllers. The outputs read from left to right and are designated as follows:

- | | |
|-----------------------------------|---|
| 1 - Crank on Battery 1 | 2 - Crank on Battery 2 |
| 3 - Audible Alarm | 4 - Common Alarm |
| 5 - User 1 (Low System Pressure) | 6 - User 2 (Flow Meter On) |
| 7 - User 3 (Fuel Spill) | 8 - User 4 (Series Pumping Out) |
| 9 - User 5 (Low Suction Pressure) | 10 - User 6 (Common Charger/Battery Fault
Charger 1 Failure) |
| 11 - User 7 (Charger 2 Failure) | 12 - User 8 (Battery 1 Trouble) |

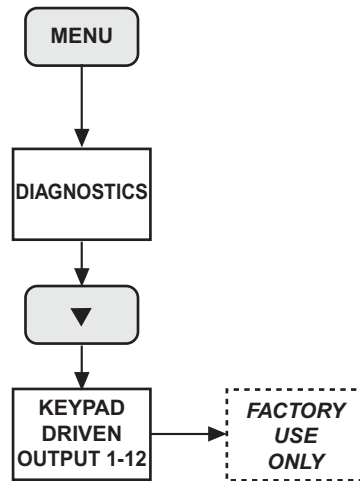
DIAGNOSTICS - DISCRETE OUTPUTS 13-24



To view outputs from the Mark II press MENU until the “Diagnostics” screen appears. Use the ▼ key to scroll to the “Disc. Outputs 13-24” screen. This screen displays the status of outputs 13-24 from the Mark II. A zero designates no output, a 1 indicates an output is present. Not all outputs may be used on all controllers. The outputs read from left to right and are designated as follows:

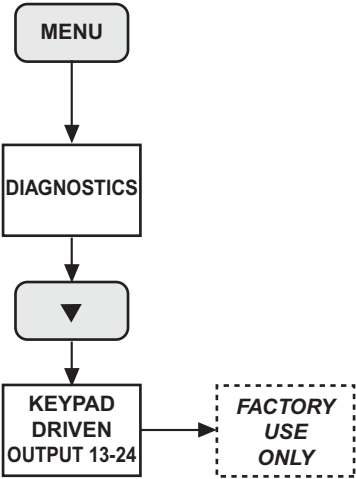
- | | |
|------------------------------|---------------------------------|
| 13 - Test Solenoid | 14 - Engine Run |
| 15 - Engine Overspeed | 16 - CPU Failure |
| 17 - Fuel Valve | 18 - Not in Auto |
| 19 - Engine Trouble | 20 - Common Pump Room Trouble |
| 21 - Engine Temperature High | 22 - Engine Oil Pressure Low |
| 23 - Fail to Start | 24 - User 9 (Battery 2 Trouble) |

DIAGNOSTICS - KEYPAD DRIVEN OUTPUT 1-12



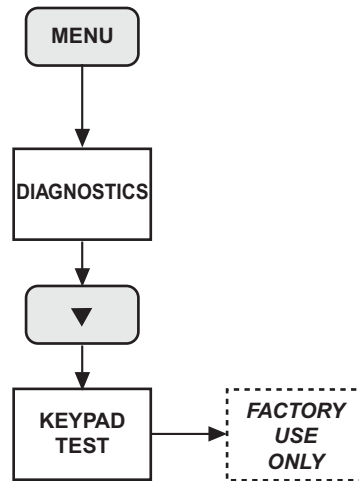
The Keypad Driven Output is a diagnostic tool to be used only by factory service technicians.

DIAGNOSTICS - KEYPAD DRIVEN OUTPUT 13-24



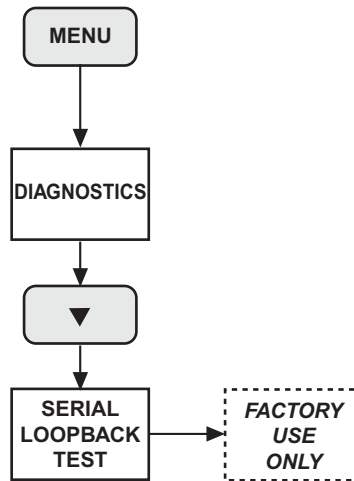
The Keypad Driven Output is a diagnostic tool to be used only by factory service technicians.

DIAGNOSTICS - KEYPAD TEST



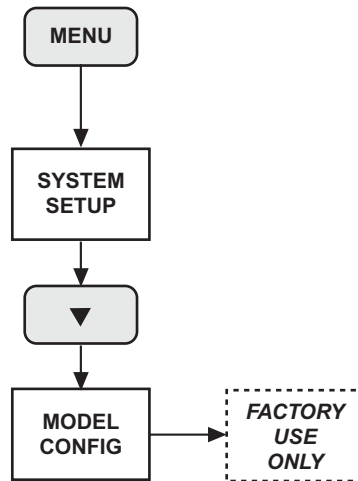
The Keypad Driven Output is a diagnostic tool to be used only by factory service technicians.

DIAGNOSTICS - SERIAL LOOPBACK TEST



The Serial Loopback Test is a diagnostic tool to be used only by factory service technicians.

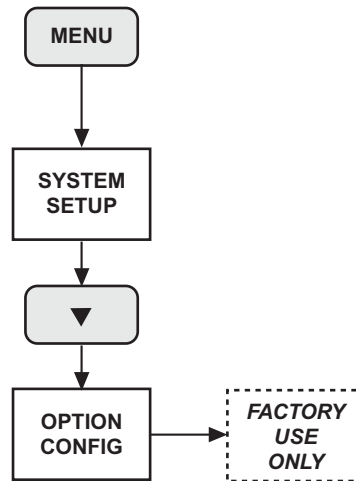
SYSTEM SETUP - MODEL CONFIGURATION



To view the controller model configuration press MENU until the “System Setup” screen appears. Press the ▼ key to scroll to the “Model Configuration” screen. The existing value will be shown.

The model configuration supplies information vital to the operation of the Mark II. The model configuration can only be changed by factory service technicians.

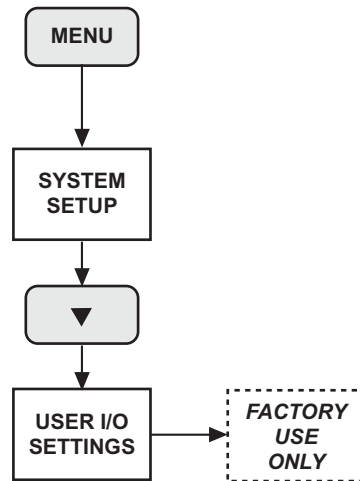
SYSTEM SETUP - OPTION CONFIGURATION



To view the controller option configuration press MENU until the “System Setup” screen appears. Press the ▼ key to scroll to the “Option Configuration” screen. The present value will be shown.

The option configuration supplies information vital to the operation of the Mark II. The model configuration can only be changed by factory service technicians.

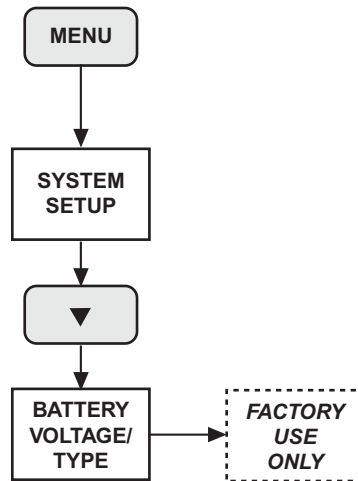
SYSTEM SETUP - USER I/O SETTINGS



To view the User I/O Settings press MENU until the “System Setup” screen appears. Press the ▼ key to scroll to the “User I/O Settings” screen. The present value will be shown.

The option configuration supplies information vital to the operation of the Mark II. The User I/O settings can only be changed by factory service technicians.

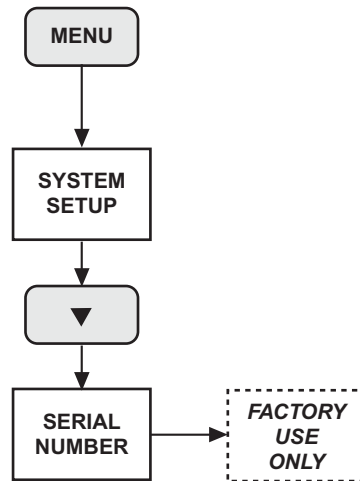
SYSTEM SETUP - BATTERY VOLTAGE/TYPE



To view the controller battery voltage/type configuration press MENU until the “System Setup” screen appears. Press the ▼ key to scroll to the “Battery Voltage/Type” screen. The set value will be shown. This value should match the battery voltage and type of the batteries connected to the controller.

The battery voltage/type setting supplies information vital to the operation of the Mark II. The setting can only be changed by factory service technicians.

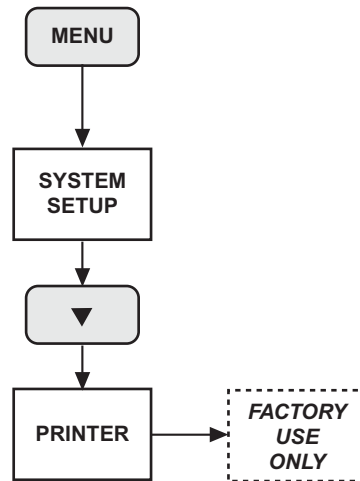
SYSTEM SETUP - SERIAL NUMBER



To view the controller Serial Number press MENU until the “System Setup” screen appears. Press the ▼ key to scroll to the “Serial Number” screen. The present value will be shown.

The serial number supplies information vital to record keeping. The serial number can only be changed by factory service technicians.

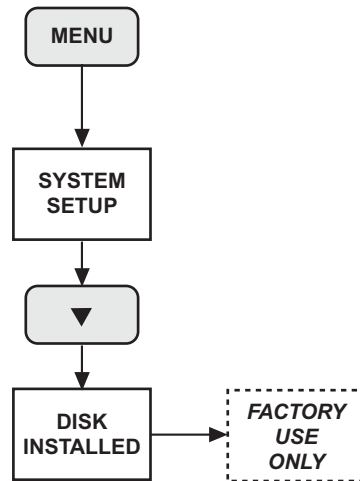
SYSTEM SETUP - PRINTER INSTALLED



To view the Printer setting press MENU until the “System Setup” screen appears. Press the ▼ key to scroll to the “Printer Installed” screen. The existing value will be shown.

The printer installed setting supplies information vital to the operation of the Mark II. The printer installed setting can only be changed by factory service technicians.

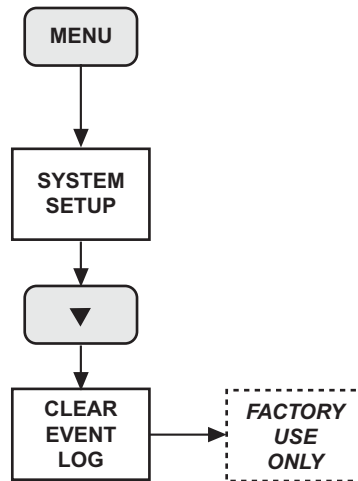
SYSTEM SETUP - DISK INSTALLED



To view the Disk Drive setting press MENU until the “System Setup” screen appears. Press the ▼ key to scroll to the “Disk Installed” screen. The existing value will be shown.

The Disk Installed setting supplies information vital to the operation of the Mark II. The Disk Installed setting can only be changed by factory service technicians.

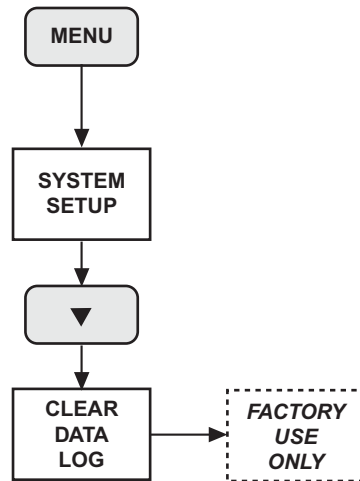
SYSTEM SETUP - CLEAR EVENT LOG



The Event Log contains historical information regarding events surrounding the controller operation.

The Event Log can only be cleared by factory service technicians.

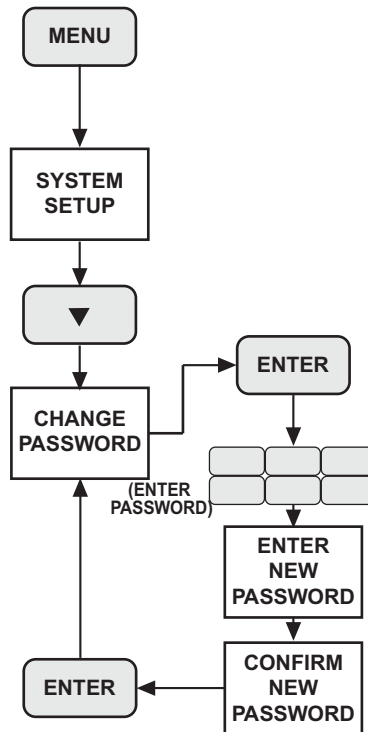
SYSTEM SETUP - CLEAR DATA LOG



The Data Log contains historical information regarding events surrounding the controller operation.

The Data Log can only be cleared by factory service technicians.

SYSTEM SETUP - CHANGE PASSWORDS

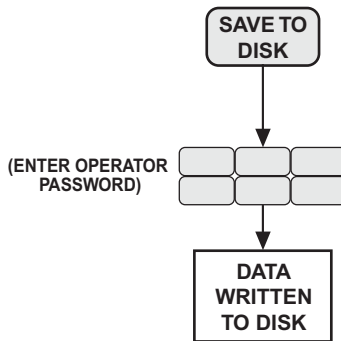


The controller is shipped with pre-programmed passwords. Each password “level” can change it’s own level and any level below it. This manual only details level 1 “operator”, and level 2 “supervisor” functions. Any settings that cannot be changed with a level 1 or level 2 password will require a factory trained service technician.

To change the Password, press MENU until the “System Setup” screen appears. Press the ▼ key to scroll to the “Change Password” screen. Press ENTER to change the password. Enter the “level password”. Use the ▲ and ▼ keys to select the password level to change. Enter the new password. Confirm the new password. Press ENTER to store the new password.

Note: If passwords are changed, then forgotten, costs may be incurred for a factory service technician to visit the job site to reset the password.

1.44MB 3.5" FLOPPY DISK DRIVE



The controller is supplied standard with a 3.5" floppy disk drive, a log of all events are written to the disk. The log is automatically written to the disk on a daily basis at the end of each day (0:00). This record is broken down into monthly files on the disk. Each file consists of one month's worth of data, broken down into individual days. For example the recorded data for the month of August, 2001 would have a file named "2001-08.txt". The data is recorded in text (.txt) format and can be viewed with any text editor, but the recommended method is to import the data into a spreadsheet program such as Microsoft® Excel®. This allows for easier sorting and searching of the data.

Data can be written to the disk at any time by pressing the SAVE TO DISK button on the Mark II interface. Enter the "operator" password. The display will show "Disk Save Active" while the file is being written to the disk, the time and date will reappear when the save is complete. The name of the file written to the disk will be "Savedisk.txt". This file will contain the contents of the Event Log, the Data Log and the System Setup. When using the SAVE TO DISK function, any previous "Savedisk.txt" file on the disk will be overwritten with the new file.

A DISK ERROR message will be given if a disk is not inserted into the drive and data is attempting to write to the disk. To clear this error, insert a disk into the drive and press the SAVE TO DISK push-button on the Mark II. A DISK FULL ERROR will occur if insufficient space remains on the disk for a file attempting to write to the disk. To clear this error, insert a blank disk and press the SAVE TO DISK push-button on the Mark II. A DISK NEAR FULL message will be given prior to DISK FULL ERROR and a new disk should be inserted at that time.



Buyer's acceptance of the Goods will manifest Buyer's assent to these terms and conditions.

The ASCO Power Technologies, L.P. (hereinafter called "Seller") agrees to sell the goods covered herein on the following terms and conditions of sale. Any additional or different terms that may be contained in any documents furnished by the Buyer are hereby objected to and rejected.

THIS CONTRACT CONSTITUTES THE ENTIRE AGREEMENT BETWEEN BUYER AND SELLER WITH RESPECT TO THE GOODS FURNISHED HEREUNDER. NO REPRESENTATION, PROMISE OR CONDITION NOT SET FORTH HEREIN HAS BEEN RELIED UPON BY BUYER OR SHALL BE BINDING ON EITHER PARTY HERETO.

1. **ORDERS:** Orders are subject to acceptance at home office of the Seller.

2. **PRICE, DISCOUNTS, and MINIMUM BILLING:** All prices, discounts, and minimum billing are in accordance with the established price and discount schedule of the Seller, AND ARE SUBJECT TO CHANGE WITHOUT NOTICE. Merchandise will be invoiced at prices prevailing at time of shipment. All prices are F.O.B. Shipping Point. Subject to establishment of satisfactory credit, terms are strictly net cash, thirty days from date of invoice payable in United States funds.

3. **CREDIT CONDITIONS:** If, at any time, the financial condition of Buyer, or Buyer's prior performance under the terms of this or any other agreement with Seller shall cause Seller to question Buyer's ability to perform, Seller may demand adequate assurance of Buyer's financial condition due to performance. Such demand for assurance may require full payment of all amounts then due and owing by Buyer, or may require partial or full advance payment of the purchase price of goods which have been scheduled for delivery, but shall not be limited to the foregoing. If Buyer fails within 10 days of Seller's demand to provide the Seller with such assurance, Seller shall be entitled to cancel any order then outstanding, shall be entitled to receive reimbursement for its cancellation charges, and may proceed to collect, without limitation, any sums due and owing, its cancellation charges and all damages resulting from Buyer's default. In the event of bankruptcy or insolvency of Buyer, or in the event of any proceeding brought against Buyer, voluntary or involuntary, under the bankruptcy or any insolvency laws, Seller shall be entitled to cancel any orders then outstanding at any time during the period allowed for filing claims against the estate and shall receive reimbursement for its reasonable and proper cancellation charges.

4. **DESIGNS:** All designs and specifications shown in Seller's catalog are subject to change without notice.

5. **SHIPMENT and DELIVERY:** Shipments are made F.O.B. Seller's shipping point. Freight charged on shipments includes freight plus shipping and handling charges. Risk of loss or damage and responsibility shall pass from Seller to Buyer upon delivery. While Seller will use all reasonable commercial efforts to maintain the delivery date(s) acknowledged or quoted by Seller, all shipping dates are approximate and not guaranteed. Seller reserves the right to make partial shipments. Seller, at its option, shall not be bound to tender delivery of any goods for which Buyer has not provided shipping instructions.

6. **FORCE MAJEURE:** Seller shall not be liable in any way for any default or delay in shipping due to contingencies beyond its control, or the control of its suppliers or sub-contractors, which prevents or interferes with the Seller making delivery on the date specified, including but not limited to war, or restraints affecting shipping, delivery of materials or credit as a result of war or war restrictions, non-arrival, delay or failure to produce materials as a result of war or war restrictions,

rationing of fuel, strikes, lockouts, fires, bombings, acts of terrorism, accidents, floods, droughts and any other contingency affecting the Seller, its suppliers, or sub-contractors; and the Seller shall have the right to cancel a contract of sale or to extend the shipping date in the event that one or more of such contingencies prevent or delay shipments. In the event of delayed or extended shipping instructions, any additional shipping charges shall be paid by the Buyer as a part of the purchase price.

7. **WEIGHTS and DIMENSIONS:** Shipping weights and dimensions given in Seller's catalog are as close to actual as practicable but are not guaranteed. No claims will be allowed because of any discrepancy between actual weight or dimensions shipped and listed data.

8. **SHIPPING and PACKING:** All material is carefully packed for shipment and Seller will not be responsible for loss, delay or breakage after having received "in good order" receipts from the transportation company. All claims for breakage, loss, delay and damage must be made to carriers. In the absence of directions, goods will be shipped by the method and via carrier Seller believes dependable.

Goods held in factory beyond delivery date for convenience of Buyer will be invoiced on date of completion and terms of payment will apply as from invoice date. Such goods will be subject to charges for warehousing and other expenses incident to such delay.

9. **CANCELLATION:** Buyer may cancel orders only upon reasonable advance written notice and upon payment to Seller of Seller's cancellation charges which include, among other things, all costs and expenses incurred, and to cover commitments made, by the Seller and a reasonable profit thereon. Seller's determination of such termination charges shall be conclusive.

10. **WARRANTIES:** The Seller warrants its products and equipment to be free from defects in material and workmanship for a period of eighteen (18) months from date of shipment from its factory.

The Seller is not responsible for damage to its products through normal wear and tear, improper installation, maintenance, use, repairs or adjustments, or attempts to operate it above its rated capacity or voltage, intentionally or otherwise, or for unauthorized repairs. To the extent that Seller has relied upon specifications, information, representation of operating conditions or other data supplied by Buyer or its agents to Seller in the selection or design of the goods and the preparation of Seller's quotation, and in the event that actual operating conditions or other conditions differ from those represented by Buyer and relied upon by Seller, any warranties or other provisions contained herein which are affected by such conditions shall be null and void.

NO OTHER REPRESENTATIONS, GUARANTEES OR WARRANTIES, EXPRESS OR IMPLIED, ARE MADE BY THE SELLER AND THE FOREGOING WARRANTY IS IN LIEU OF ALL OTHER REPRESENTATIONS AND WARRANTIES, EXPRESS OR IMPLIED, WHICH ARE HEREBY EXPRESSLY DISCLAIMED AND WAIVED BY BUYER, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR PARTICULAR PURPOSE, WHETHER OR NOT THE PURPOSE OR USE HAS BEEN DISCLOSED TO SELLER IN SPECIFICATIONS, DRAWINGS OR OTHERWISE, AND WHETHER OR NOT SELLER'S PRODUCTS ARE SPECIFICALLY DESIGNED AND/OR MANUFACTURED BY SELLER FOR BUYER'S USE OR PURPOSE.

11. **NOTICE OF CLAIM BY BUYER:** Seller shall have no liability on any claim by Buyer with respect to any product furnished hereunder alleged to be not in conformity with the terms and conditions hereof, or with any warranty expressed in these

terms and conditions unless written notice specifying such claim shall have been sent by Buyer to Seller promptly after the earliest date on which the basis for such claim could have been discovered by Buyer with reasonable diligence, but in no event later than one year from date of shipment. Seller shall not be liable to Buyer for any claim under this contract of which it does not receive written notice as provided in the preceding sentence. Failure to so notify Seller shall constitute a waiver of any and all claims hereunder.

12. LIMITATIONS UPON REMEDIES OF BUYER AND OTHERS: AS TO ANY CLAIM OF WHATEVER NATURE ASSERTED AGAINST SELLER THAT IS RELATED TO THIS TRANSACTION OR TO THE GOODS WHICH ARE THE SUBJECT THEREOF, THE REMEDIES OF THE BUYER AND ALL OTHERS CLAIMING UNDER, WITH, OR THROUGH THE BUYER ARE EXPRESSLY LIMITED TO THE FOLLOWING: (A) SELLER WILL, AT ITS OPTION, EITHER (1) REPAIR OR REPLACE AN ALLEGEDLY NON-CONFORMING PRODUCT AT THE DELIVERY POINT SPECIFIED HEREIN, OR (2) REPAY THE CONTRACT PRICE HEREIN OF SUCH PRODUCT UPON ITS RETURN BY BUYER TO SAID DELIVERY POINT, PLUS ANY TRANSPORTATION CHARGES PAID BY BUYER IN ADDITION TO SUCH PRICE, (B) NOTWITHSTANDING ANY OTHER PROVISION OR TERM OF THIS CONTRACT OR OF ANY EXISTING OR FUTURE DOCUMENT OR INSTRUMENT BEING DEEMED PART OF THIS CONTRACT, THE LIMIT OF SELLER'S LIABILITY WITH RESPECT TO THIS TRANSACTION OR WITH RESPECT TO THE GOODS WHICH ARE THE SUBJECT THEREOF, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE) SHALL, EXCEPT AS EXPRESSLY PROVIDED OTHERWISE IN PARAGRAPH (A), BE THE CONTRACT PRICE HEREIN OF THE SPECIFIC PRODUCT SUPPLIED BY THE SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. THE TERM "CONSEQUENTIAL DAMAGES" SHALL INCLUDE, BUT NOT BE LIMITED TO, LOSS OF ANTICIPATED PROFITS, LOSS OF USE, LOSS OF REVENUE, COST OF CAPITAL, AND DAMAGE OR LOSS OF OTHER PROPERTY OR EQUIPMENT. (C) Seller shall not be liable for and Buyer assumes responsibility for all personal injury and property damage resulting from the handling, possession or use of the goods; (D) The foregoing is intended as a complete allocation of the risks between the parties. Because the bargain struck and the price paid reflect such allocations this limitation upon remedies will not have failed of its essential purpose. It is expressly understood that any technical advice furnished by Seller with respect to the use of the Goods is given without charge, and Seller assumes no obligation or liability for the advice given, or results obtained, all such advice being given and accepted at Buyer's risk.

13. PATENTS: Subject to the limitations of Section 12, Seller shall defend any suits brought against Buyer based on a claim that the Goods provided by Seller constitutes an infringement of a valid patent of the United States, and shall pay any damages and reasonable costs awarded therein against Buyer, provided that Buyer promptly notifies the Seller in writing and gives authority, information and assistance to Seller for defense of such suit and permits Seller to control completely the defense, settlement or compromise of any such allegation of infringement. In the event that the Goods provided by Seller

are held to be infringing in such suit and their use is enjoined, Seller shall, at Seller's expense and option, provide a commercially acceptable alternative, including, but not limited to, procuring for Buyer the right to continue using the Goods, replacing them with non-infringing goods or modifying them so they become non-infringing, or grant Buyer a credit for the depreciated value of such Goods and accept return of them. In the event of the foregoing, Seller may also, at its option, cancel this agreement as to future deliveries of such Goods, without liability. Buyer agrees that Seller shall not be liable and that Buyer shall fully indemnify Seller if infringement is based upon the use of Goods in connection with products or services not manufactured and/or provided by Seller or in a manner for which the Goods were not designed by Seller or if the Goods were designed by Buyer or were modified by or for the Buyer in a manner to cause them to become infringing.

14. NUCLEAR GOODS AND SERVICES SOLD HEREUNDER ARE NOT FOR USE IN ANY NUCLEAR AND RELATED APPLICATIONS: Buyer accepts goods and services with the foregoing understanding, agrees to communicate the same in writing to any subsequent purchasers or users and to defend, indemnify and hold harmless Seller from any claims, losses, suits, judgments and damages, including incidental and consequential damages, arising from such use, whether the cause of action be based in tort, contract or otherwise, including allegations that the Seller's liability is based on negligence or strict liability.

15. TAXES: Any manufacturer's excise tax, use tax, sales tax, or tax or duty of any nature whatsoever arising out of or assessed against orders, shall be added to the price quoted or invoiced and shall be paid by the Buyer; and in the event Seller is required to pay any such taxes or duties, the Buyer shall reimburse Seller therefor, unless Buyer shall provide Seller at the time an order is submitted with exemption certificates or other documents acceptable to taxing or custom authorities.

16. ASSIGNMENT: Buyer shall not assign its rights or delegate its duties hereunder or any interest therein or any rights hereunder without the prior written consent of the Seller, and any such assignment, without such consent, shall be void.

17. GENERAL PROVISIONS: These terms and conditions supersede all other communications, negotiations, and prior oral or written statements regarding the subject matter of these terms and conditions. No changes, modification, rescission, discharge, abandonment, or waiver of these terms and conditions shall be binding upon the Seller unless made in writing and signed on its behalf by a duly authorized representative of the Seller. No conditions, usage of trade, course of dealing or performance, understanding or agreement purporting to modify, vary, explain, or supplement these terms and conditions shall be binding unless hereafter made in writing and signed by the party to be bound, and no modification or additional terms shall be applicable to this agreement by the Seller's receipt, acknowledgment, or acceptance of purchase orders, shipping instruction forms, or other documentation containing terms at variance with or in addition to those set forth herein. No waiver by either party with respect to any breach or default or of any right or remedy and no course of dealing, shall be deemed to constitute a continuing waiver of any other breach or default or of any other right or remedy, unless such waiver be expressed in writing and signed by the party to be bound. The validity, performance and all other matters relating to the interpretation and effect of this agreement shall be governed by the law of the State of New Jersey. Buyer and Seller agree that the proper venue for all actions arising in connection herewith shall be only in New Jersey and the parties agree to submit to such jurisdiction. All clerical errors are subject to correction.

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This Agreement consisting of these terms and conditions, the typed or written portion of the attendant quotation and acknowledgment, and price lists referenced herein, is binding upon ASCO Services, Inc. hereinafter Seller, and the Customer, hereinafter Buyer, and is the entire Agreement. The terms and conditions set forth herein shall apply to all Services as defined below. Seller reserves the right to determine the qualifications of and the source of the representatives required to provide Services. These terms and conditions shall be in lieu of any other terms and conditions contained in a purchase order, request for quotation or other document and all other terms and conditions are expressly rejected by Seller. Seller's acceptance of an order or offer to purchase which is received from Buyer is expressly conditioned upon Buyer's acceptance of the terms and conditions set forth herein.

1. DEFINITIONS: As used herein, the term Service shall include:

- a. Field Services. Equipment start up, repair, maintenance, calibration, cleaning and replacement of parts at Buyer's location.
- b. Contract Services. Maintenance and repair services performed under the terms & conditions of a signed inspection & maintenance agreement
- c. Consulting Services. The process of assisting the Buyer in designing, implementing and/or modifying parameters and/or configurations of Seller goods.
- d. Training Courses. On-site and off-site lectures, lab or classroom training. Seller is not responsible for transportation, lodging, meals and other expenses incurred by Buyer or its representative attending the course. Seller reserves the right to cancel a course due to insufficient enrollment with refund of all prepaid fees.
- e. Service Center Repairs. Equipment repair, maintenance, calibration, cleaning and replacement of parts at Seller's designated Service Center or factory.
- f. Goods. All equipment, repair parts and supplies, software and software media, manuals, documents, and other items except personal services furnished in connection with Field Services, Consulting Services, Training Courses and Service Center Repairs.

2. SPECIFICATION OF CONTRACT SERVICES TO BE PROVIDED: All contract services to be provided by Seller shall be described in a written specification signed by Seller and the Buyer before Seller provides Services. At Seller's discretion and upon Buyer's request, Seller may agree to provide Services on an emergency basis.

3. PRICES:

- a. Seller and Buyer agree (1) the price of Services shall be Seller's published price in effect at the date of order acceptance; (2) all sales for Goods from Seller's Service Center or factory are F.O.B. Seller's Service Center or factory. Shipping contracts made by Seller shall be to Buyer's account. All claims for loss or damage after risk of loss has passed to Buyer shall be filed by Buyer with the carrier. Buyer shall be liable to Seller for the full price of the goods, irrespective of loss or damage in transit. Seller shall not be required to provided freight cost receipts at the time of invoice.
- b. Hourly prices are based on a standard eight hour work day between 8:00 AM and 5:00 PM, Monday through Friday, local time. All hours in excess or outside of this eight (8) hour period and those hours worked on Saturday including travel are charged 1.5 times the price list rate. Sunday and Seller holiday rates shall be 2.0 times the price list rate. Buyer shall pay for all time Seller representatives are working, traveling or waiting, whether on or off the job site, to provide Services.
- c. Buyer shall be liable to Seller for all travel and living expenses incurred by Seller representatives in the course of providing Services (including without limitation, hotel, meals, air, rail, bus, taxi, car rental and automobile mileage if a personal or company vehicle is used).

4. PERMITS, FEES AND TAXES: Buyer shall obtain and pay for permits, licenses and other approvals required for Seller to furnish Services to Buyer. Buyer shall also be responsible for all sales, use, excise or similar taxes assessed from sale of Services.

5. VISITOR PASSES: Buyer shall provide Seller with such access to Buyer's premises as Seller deems reasonably necessary to provide Services. In the case of secure facilities the buyer shall notify seller of all required security clearances prior to scheduling work. These terms and conditions shall supersede provisions in Buyer's visitor pass forms, access agreements (premises or equipment) or similar documents, whether or not the same is executed by Seller's representatives.

6. FACILITIES AND ACCESS TO EQUIPMENT: The Buyer shall furnish to Seller, at no cost, suitable working space, storage space, adequate heat, telephone, light, ventilation, regulated electric power and outlets for testing purposes. These facilities shall be within a reasonable distance from where the Services are to be provided. Seller and its representatives shall have full and free access to the equipment in order to provide the necessary Services. Buyer shall provide the means to shut off and secure the power to the equipment to provide safe working conditions. Buyer shall inform Supplier, in writing, at the time of order placement, of any known hazardous substance or condition at the site, including, but not limited to, the presence of asbestos or asbestos containing materials, and shall provide Supplier with any applicable Material Data Safety Sheets regarding same. Any losses, costs, damages, claims and expenses incurred by Supplier as a result of Buyer's failure to so advise Supplier shall be borne by Buyer. Buyer shall appoint a representative familiar with the site and the nature of the services to be performed by Supplier to be accessible at all times that Supplier personnel are at the site. Supplier shall not be liable for any expenses incurred by Buyer in removing, replacing or refurbishing any Buyer equipment or any part of Buyer's building structure that restricts Supplier access. Buyer personnel shall cooperate with and provide all necessary assistance to Supplier. Supplier shall not be liable or responsible for any work performed by Buyer

7. TERMS OF PAYMENT: Payments are due thirty (30) days after the invoice date. A service charge of 1.5% shall be charged for each month and portion thereof that payments are received later than thirty (30) days after the invoice date. Buyer and Seller agree that the laws of the State of New Jersey govern this Agreement. However, if it is judicially determined that a different law governs this clause of this Agreement, the service charge shall be the maximum amount permitted under such law.

8. SHIPMENT AND DELIVERY: Shipments are made F.O.B. Seller's shipping point. Freight charged on shipments includes freight plus shipping and handling charges. Risk of loss or damage and responsibility shall pass from Seller to Buyer upon delivery. While Seller will use all reasonable commercial efforts to maintain the delivery date(s) acknowledged or quoted by Seller, all shipping dates are approximate and not guaranteed. Seller reserves the right to make partial shipments. Seller, at its option, shall not be bound to tender delivery of any goods for which Buyer has not provided shipping instructions.

9. FORCE MAJEURE: Supplier shall not be liable or responsible for cost, expense, or damage due to a delay in performance of services or other obligations when such delay is due to causes beyond Supplier's reasonable control, including, but not limited to, acts of God; acts of Buyer; war; fire; flood; weather; sabotage; strikes or labor disputes; civil disturbances or riots; governmental requests, restrictions, allocations, laws, regulations, orders or actions; unavailability of or delays in transportation; default of suppliers; or unforeseen circumstances. Performance may be suspended for an appropriate period of time or canceled by Supplier upon notice to Buyer in the event of any of the foregoing, but the balance of the agreement shall otherwise remain unaffected as a result of the foregoing.

10. TERMINATION OR SUSPENSION: Provided that Seller receives adequate written notice from Buyer, Buyer may terminate or suspend performance under this agreement at Buyer's convenience subject to Buyer's payment to Seller of all reasonable charges, which include, among other things, all costs and reasonable expenses incurred, and to cover commitments made, by the Seller and a reasonable profit thereon. In the case of Training Courses to be presented to Buyer at Seller's premises and not scheduled solely for Buyer's

representatives, no cancellation charge shall be payable if Seller receives notice of cancellation at least two weeks before the first day of training. Supplier may, at Supplier's sole discretion, terminate the Services Agreement without liability to Buyer if Buyer (i) fails to meet its obligations identified in the Services Agreement or these terms and conditions, (ii) becomes insolvent or bankrupt, or (iii) withdraws such quantity, models or types of equipment on which services are performed and, Supplier, in its reasonable judgment, determines that it is no longer economically reasonable for Supplier to continue to provide service to the remaining equipment based upon the then current pricing and contractual terms.

11. **LIMITED WARRANTY:** Seller warrants that all Services provided and parts used in providing Services shall be free from faulty workmanship and defects in material under normal use and service for a period of thirty (30) days from the date Services were provided by Seller. Services proven by Seller to be faulty in workmanship and/or defective in material shall be repaired, free of charge, provided Seller is notified within the thirty (30) day period of this warranty. For Service Center Repairs, the foregoing warranty provision shall apply provided that goods or part(s) are returned to Seller's designated Service Center or factory, F.O.B. Seller's Service Center or factory, transportation charges prepaid, within the thirty (30) day period of this warranty. IN CONSIDERATION OF THE HEREINSTATED PURCHASE PRICE OF THE SERVICE, SELLER GRANTS ONLY THE ABOVE STATED EXPRESS WARRANTY. NO OTHER WARRANTIES ARE GRANTED INCLUDING, BUT NOT LIMITED TO, EXPRESS AND IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

12. **LIMITATIONS UPON REMEDIES OF BUYER AND OTHERS:** AS TO ANY CLAIM OF WHATEVER NATURE ASSERTED AGAINST SELLER THAT IS RELATED TO THIS TRANSACTION OR TO THE GOODS OR SERVICES WHICH ARE THE SUBJECT THEREOF, THE REMEDIES OF THE BUYER AND ALL OTHERS CLAIMING UNDER, WITH, OR THROUGH THE BUYER ARE EXPRESSLY LIMITED TO THE FOLLOWING: (A) SELLER WILL, AT ITS OPTION, EITHER (1) REPAIR OR REPLACE AN ALLEGEDLY NON-CONFORMING PRODUCT OR SERVICE AT THE DELIVERY POINT SPECIFIED HEREIN, OR (2) REPAY THE CONTRACT PRICE HEREIN OF SUCH PRODUCT UPON ITS RETURN BY BUYER TO SAID DELIVERY POINT, PLUS ANY TRANSPORTATION CHARGES PAID BY BUYER IN ADDITION TO SAID PRICE, (B) NOTWITHSTANDING ANY OTHER PROVISION OR TERM OF THIS CONTRACT OR OF ANY EXISTING OR FUTURE DOCUMENT OR INSTRUMENT BEING DEEMED PART OF THIS CONTRACT, THE LIMIT OF SELLER'S LIABILITY WITH RESPECT TO THIS TRANSACTION OR WITH RESPECT TO THE GOODS OR SERVICES WHICH ARE THE SUBJECT THEREOF, REGARDLESS OF THE FORM OF THE CLAIM OR CAUSE OF ACTION (WHETHER BASED IN CONTRACT, INFRINGEMENT, NEGLIGENCE, STRICT LIABILITY, OTHER TORT OR OTHERWISE) SHALL, EXCEPT AS EXPRESSLY PROVIDED OTHERWISE IN PARAGRAPH (A), BE THE CONTRACT PRICE HEREIN OF THE SPECIFIC PRODUCT OR SERVICE SUPPLIED BY THE SELLER GIVING RISE TO THE CLAIM OR CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY TO BUYER AND/OR ITS CUSTOMERS EXTEND TO INCLUDE INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES. THE TERM "CONSEQUENTIAL DAMAGES" SHALL INCLUDE, BUT NOT BE LIMITED TO, LOSS OF ANTICIPATED PROFITS, LOSS OF USE, LOSS OF REVENUE, COST OF CAPITAL AND DAMAGE OR LOSS OF OTHER PROPERTY OR EQUIPMENT. (C) SELLER SHALL NOT BE LIABLE FOR AND BUYER ASSUMES RESPONSIBILITY FOR ALL PERSONAL INJURY AND PROPERTY DAMAGE RESULTING FROM THE HANDLING, POSSESSION OR USE OF THE GOODS OR SERVICES. (D) THE FOREGOING IS INTENDED AS A COMPLETE ALLOCATION OF THE RISKS BETWEEN THE PARTIES. BECAUSE THE BARGAIN STRUCK AND THE PRICE PAID REFLECT SUCH ALLOCATIONS THIS LIMITATION UPON REMEDIES WILL NOT HAVE FAILED OF ITS ESSENTIAL PURPOSE. IT IS EXPRESSLY

UNDERSTOOD THAT ANY TECHNICAL ADVICE FURNISHED BY SELLER WITH RESPECT TO THE USE OF THE GOODS OR SERVICES IS GIVEN WITHOUT CHARGE, AND SELLER ASSUMES NO OBLIGATION OR LIABILITY FOR THE ADVICE GIVEN, OR RESULTS OBTAINED, ALL SUCH ADVICE BEING GIVEN AND ACCEPTED AT BUYER'S RISK.

13. **INSURANCE:** Seller certifies that Worker's Compensation coverage on its personnel is adequate under local law.

14. **AMENDMENTS:** The terms and conditions set forth herein constitute the entire Agreement of the parties relating to the subject herein and no amendment shall be effective unless it is in writing and signed by the authorized party of both Seller and Buyer. Buyer agrees that Seller's service personnel have no authority to add, delete or modify these terms and conditions.

15. **GENERAL PROVISIONS:** (a) Neither party shall have the right to assign its rights or obligations under this Agreement except with the written consent of the other party, provided, however, that a successor in interest by merger, or by operation of law, agreement, purchase, or otherwise of the entire business of either party, shall acquire all interest of such party hereunder. Any prohibited assignment shall be void. (b) There are no understandings, agreements or representations, expressed or implied, not specified in this Agreement. (c) No action, regardless of form arising out of transactions under this Agreement, may be brought by either party more than two (2) years after the cause of action has accrued. (d) No representative of Seller has authority to modify these terms and conditions unless the modification is contained in a written instrument signed by a duly authorized representative of Seller. (e) This Agreement is formed and shall be construed under the laws of the State of New Jersey. (f) All stenographic, typographical and clerical errors in quotations and specifications may be corrected at any time by Seller (g) No waiver by either party with respect to any breach or default or of any right or remedy, and no course of dealing, shall be deemed to constitute a continuing waiver of any other breach or default or of any other right or remedy, unless such waiver be expressed in writing and signed by the party to be bound.

16. **NUCLEAR INDEMNIFICATION:** SERVICES AND GOODS SOLD IN CONNECTION WITH THOSE SERVICES HEREUNDER ARE NOT FOR USE IN ANY NUCLEAR AND RELATED APPLICATIONS. Buyer accepts goods and services with the foregoing understanding, agrees to communicate the same in writing to any subsequent purchaser or users and to defend, indemnify, hold harmless Supplier from any claims, losses, suits, judgments and damages, including incidental and consequential damages, arising from such use, whether the cause of action be based in tort, contract or otherwise, including allegations that Supplier's liability is based on negligence or strict liability.

17. **GOVERNING LAW AND VENUE:** The validity, performance, and all other matters relating to the interpretation and effect of this agreement shall be governed by the law of the state of New Jersey. BUYER AND SUPPLIER AGREE THAT THE PROPER VENUE FOR ALL ACTIONS ARISING IN CONNECTION HERewith SHALL BE THE DISTRICT COURT OF MORRIS COUNTY, NEW JERSEY, AND THE UNITED STATES DISTRICT COURT FOR NORTHERN NEW JERSEY.

18. **SEVERABILITY:** If any Section (or part thereof) of these terms and conditions or the Services Agreement is found to be contrary to, prohibited by or invalid under any applicable law, such court may modify such Section (or part thereof) so, as modified, such Section (or part thereof) will be enforceable and will to the maximum extent possible comply with the apparent intent of the parties in drafting such Section (or part thereof). If no such modification is possible, such Section (or part thereof) shall be deemed omitted, without invalidating the remaining provisions hereof. No such modification or omission of a Section (or part thereof) shall in any way affect or impair such Section (or any part thereof) in any other jurisdiction.

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General Information Typical Pressure Sensing Line Connection Fire Pump Controllers & Jockey Pump Controllers

If water pulsation causes erratic operation of the pressure switch or the recorder, a supplemental air chamber or pulsation damper might be needed

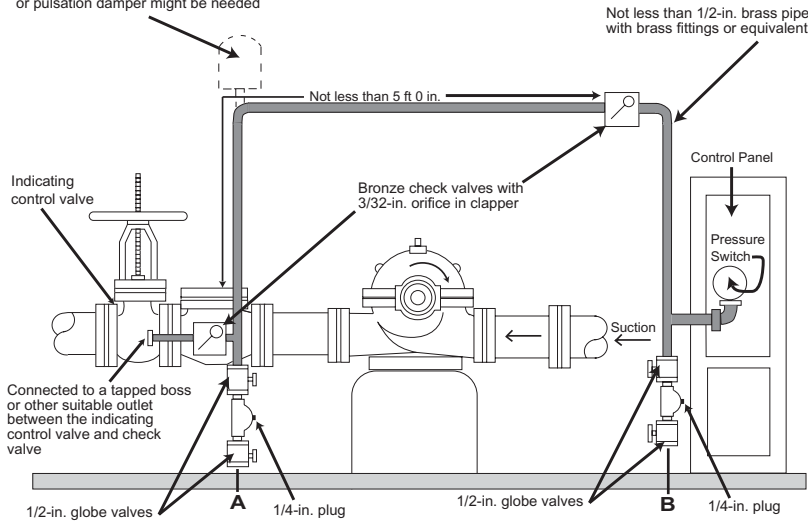


Figure A-7-5.2.1(a) Piping connection for each automatic pressure switch (for fire pump and jockey pumps).

If water is clean, ground-face unions with noncorrosive diaphragms drilled for 3/32-in. orifices can be used in place of the check valves.

For SI units, 1 in. = 25.4mm; 1 ft. = 0.3048m.

Note: Solenoid drain valve used for engine-driven fire pumps can be at A, B, or inside of controller enclosure.

Test connection at A or B

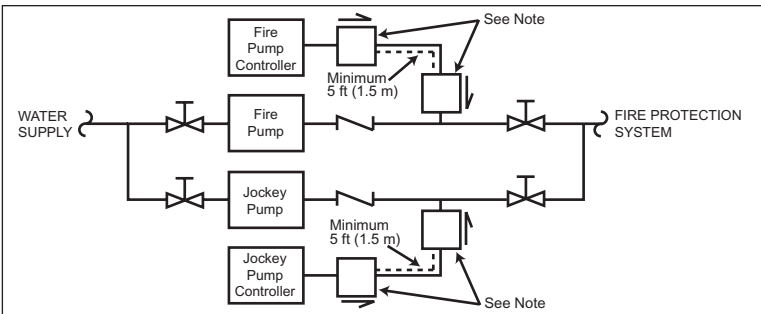


Figure A-7-5.2.1(b) Piping connection for pressure-sensing line.

Note: Check valves or ground-face unions complying with 7-5.2.1.

NFPA 20

7-5.2.1 Water Pressure Control. There shall be provided a pressure-actuated switch having independent high and low calibrated adjustments in the controller circuit. There shall be no pressure snubber or restrictive orifice employed within the pressure switch. This switch shall be responsive to water pressure in the fire protection system. The pressure sensing element of the switch shall be capable of withstanding a momentary surge pressure of 400 psi (27.6 bar) without losing its accuracy. Suitable provision shall be made for relieving pressure to the pressure-actuated switch to allow testing of the operation of the controller and the pumping unit. [See Figures A-7-5.2.1(a) and (b).]

Water pressure control shall be as follows.

- For all pump installations, including jockey pumps, each controller shall have its own individual pressure sensing line.
- The pressure sensing line connection for each pump, including jockey pumps, shall be made between that pump's discharge check valve and discharge control valve. This line shall be brass, copper, or series 300 stainless steel pipe or tube, and the fittings shall be of 1/2 inch (12.7 mm) nominal size. There shall be two check valves installed in the pressure sensing line at least 5 ft. (1.5 m) apart with a 3/32 inch (2.4 mm) hole drilled in the clapper to serve as dampening. [See figures A-7-5.2.1(a) and (b).]

Exception No. 1: If water is clean, ground-face unions with noncorrosive diaphragms drilled with 3/32-in. (2.4-mm) orifices shall be permitted in place of the check valves.

Exception No. 2: In a nonpressure-actuated controller, the pressure-actuated switch shall not be required.

- There shall be no shutoff valve in the pressure-sensing line.
- Pressure switch actuation at the low adjustment setting shall initiate pump starting sequence (if pump is not already in operation).
- A listed pressure recording device shall be installed to sense and record the pressure in each fire pump controller pressure-sensing line at the input to the controller. The pressure recorder shall be capable of operating for at least 7 days without being reset or rewind.

The pressure sensing element of the recorder shall be capable of withstanding a momentary surge pressure of at least 400 psi (27.6 bar) without losing its accuracy.

A-7-5.2.1 Installation of the pressure-sensing line in between the discharge check valve and the control valve is necessary to facilitate isolation of the jockey pump controller (and sensing line) for maintenance without having to drain the entire system. [See Figures A-7-5.2.1(a) and (b).]

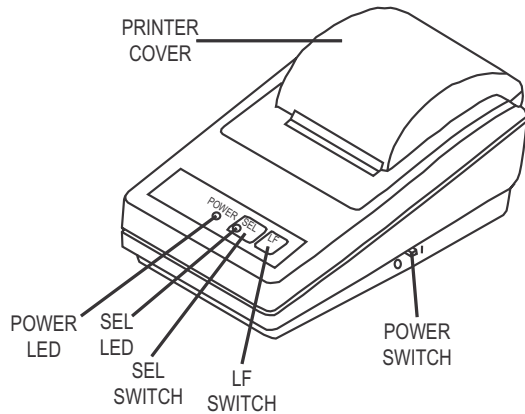
A-7-5.2.1 (e) The pressure recorder should be able to record a pressure at least 150 percent of the pump discharge pressure under no-flow conditions. In a high-rise building this requirement can exceed 400 psi (27.6 bar). This pressure recorder should be readable without opening the fire pump controller enclosure. This requirement does not mandate a separate recording device for each controller. A single multichannel recording device can serve multiple sensors.



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- Power LED - Illuminated when power is on
- SEL LED - Illuminated when printer is on line
 - LED blinks at 1/2 second intervals when paper out
 - LED blinks at 1/4 second intervals for any other alarm state
- SEL Switch - Toggle printer on/off line
- LF Switch - Paper feed (printer must be off line)
- Power Switch - Turn printer on/off
- Printer Cover - Remove to change printer paper/ribbon

SPECIFICATIONS:

- Paper - Width = 2.25 inches
 - Diameter = 2.75 inches
 - Length = 130 feet
 - Core ID 11-13 mm, OD 17-19mm
- Ribbon - Service Life = approx. 250,000 characters
- Recommended Operating Temperature = 0°C – 40°C

TO REPLACE PAPER

- 1) Place printer off line
- 2) Remove completed roll of paper from take-up spool by lifting spool off winding mechanism and sliding roll off
- 3) Remove printer cover by lifting on rear tab
- 4) Insert new paper roll as shown in fig. 1
- 5) Feed paper through printer by using the LF switch, continue to feed until paper extends just beyond the winding mechanism (Note: When printer begins to feed paper, replace the printer cover)
- 6) Fold end of paper approx. 1/4" and insert into take-up spool as shown in fig. 2. Wind the paper onto the spool a couple of times then place take-up spool back onto winding mechanism
- 7) Place printer back on line. Any information stored in the buffer will now print

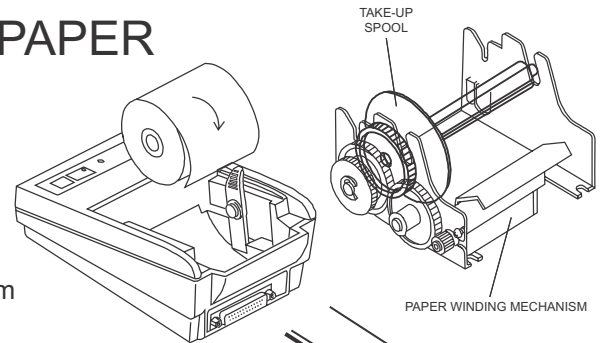


Fig. 1

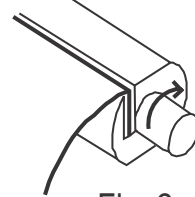


Fig. 2

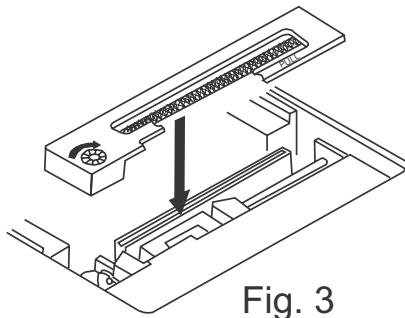


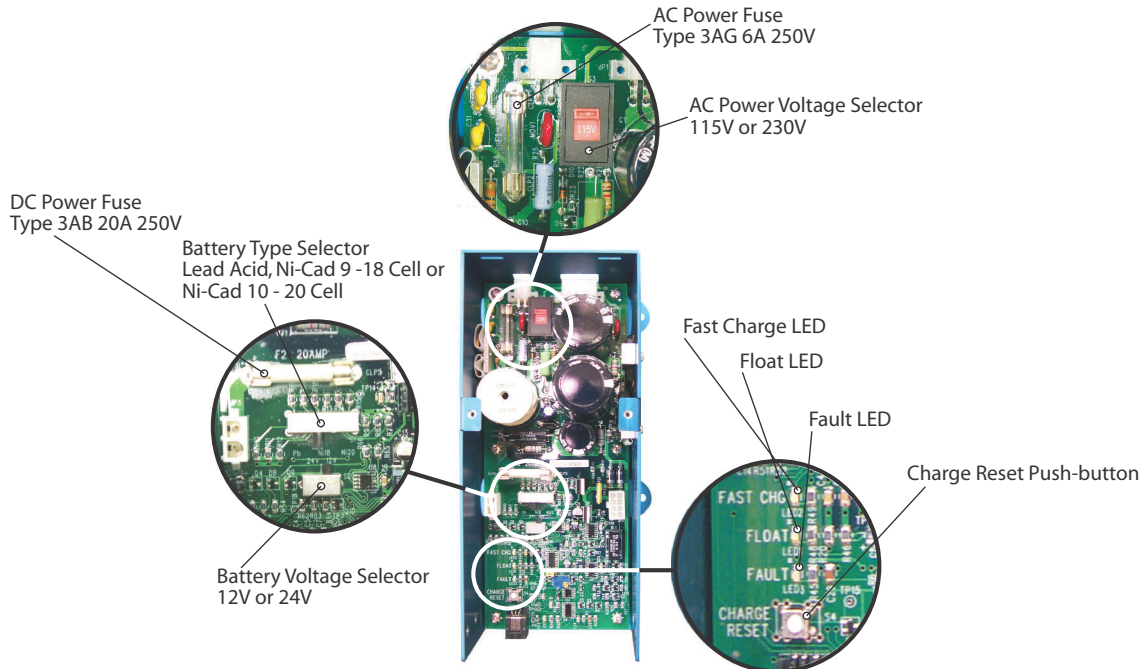
Fig. 3

TO REPLACE RIBBON

- 1) Place printer off line
- 2) Remove printer cover and paper
- 3) Remove ribbon by pulling straight up
- 4) Insert new ribbon as shown in fig. 3
- 5) Wind ribbon knob by turning in direction of arrow
- 6) Reinstall paper as described above
- 7) Place printer back on line

For replacement parts, pricing and availability contact your local representative or the factory.
 Ribbon Cartridge (Part No. MM-1161) – Paper (Part No. PP-1015) – Paper Winding Mech. (Part No. MC-1007)
 Printer/Recorder (Part No. RC-0740)

Firetrol®



The Firetrol® battery charger features a fully automatic 4 step charging cycle. The charging cycles are as indicated:

Step 1: Qualification Stage (Flashing yellow and green LEDs)

During this stage, the battery charger checks the batteries to insure they can accept a fast charge. It also checks for missing or defective batteries. If the charger detects missing or defective batteries a fault will be given (solid red LED).

Step 2: Fast Charge (Solid yellow LED)

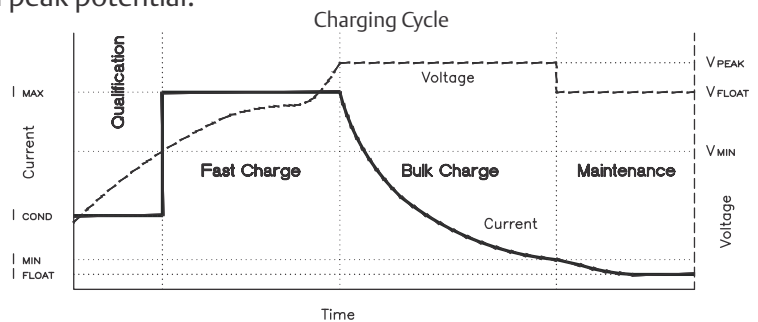
Charges the batteries until they reach peak voltage.

Step 3: Bulk Charge (Solid yellow LED and slow blinking green LED)

Charges the batteries at a constant potential of peak voltage until current reaches 500mA.

Step 4: Float Charge (Solid green LED)

Trickle charges the batteries to maintain peak potential.



The battery charger also includes the following:

- Selectable AC power voltage (115 or 230V)
- Selectable battery voltage (12 or 24V)
- Selectable battery type (Lead Acid, NiCad 9 or 18 cell, NiCad 10 or 20 cell)
- AC power fuse (Type 3AG, 6A, 250V)
- DC power fuse (Type 3AB, 20A, 250V)
- Charger reset push-button (resets charging cycle to beginning)

