

Engineer duties - Pumping multiple lines

Some fires are extinguished by single attack lines. In these situations, the Engineer's duties are rather simple to accomplish. The challenges for an Engineer are pulling up to a working fire when multiple attack lines are needed including a supply line. An Engineer must provide water to the crews at safe operating pressures. When pressures vary, a skilled Engineer will be able to achieve the desired pressures for each line in a rapid manner while maintaining safety for each crew. This requires the Engineer to multi-task by simultaneously monitoring each gauge, adjusting discharge valves and the pump throttle. This must be done while continuously monitoring radio traffic for changing needs or conditions.

It is important for the Engineer to develop proficiency in their position! This is accomplished by becoming familiar with the most efficient steps to take at the emergency scene and practicing them. Remember, if it looks like the Engineer is spending too much time fooling with discharge and relief valves, it probably means he/she has not had enough practice or has not developed the confidence in his/her duties.

Our goal in this section is to introduce steps that should be practiced which will best prepare the Engineer for this challenge.

For example, you could be pumping to the following attack lines on scene simultaneously;

<i>Size line</i>	<i>Tip/Fog nozzle</i>	<i>Gpm</i>	<i>Length of line</i>	<i>Pump pressure</i>
1 3/4"	Fog	200	200'	200
2 1/2"	Tip 1 1/4"	325	200'	90
1 3/4"	Fog	125	200'	136

The steps performed at the pump panel will vary slightly depending on which lines are placed in service first and whether or not they are needed at the same time. The table below describes **six scenarios** on the fire ground where three attack lines are placed into service at varying pressures and times. Use this table as a reference for the following pages which describe each scenario individually.

<i>Scenario</i>	<i>Initial Attack Line</i>	<i>Second Attack Line</i>	<i>Third Attack Line</i>
A	Lowest psi	Middle psi	Highest psi
B	Lowest psi	Highest psi	Middle psi
C	Middle psi	Lowest psi	Highest psi
D	Middle psi	Highest psi	Lowest psi
E	Highest psi	Lowest psi	Middle psi
F	Highest psi	Middle psi	Lowest psi

When pumping to multiple lines, keep these Important Objectives in mind.....

- Provide water to all lines at appropriate pressures.
- Minimize changing pressures to other lines as more lines are placed in service.
- Always set relief valve to highest pressure.
- Perform steps quickly, safely and efficiently.
- Achieve desired results with the least adjustments possible.
- Remember, pressures at the pump panel will fluctuate when lines are shut down or flows change.
- Keep track of your attack lines (who has the line, where it is, how much line is out; what gpm is flowing) Grease pencils are good tools for this! One or two lines can quickly turn into six at a big fire.
- Keep track of your water supply (what was your static pressure, how about your residual pressure, water still available, where is your next hydrant)
- Know your normal operating ranges for your gauges

Example A - Initial line at lowest pressure, second at middle, third at highest.

- ***Charge initial line***, open valve completely and set to proper engine pressure.
- Set relief valve to 10 lbs above desired engine pressure
- ***Charge second line***, open valve completely. (Both lines equal in pressure)
- Increase relief valve operating pressure above second line desired pressure
- Increase throttle while gating down first attack line to reach desired pressure for each line. The second line discharge valve should remain completely open and not be adjusted.
- ***Charge third line***, open valve completely. Match second line pressure while maintaining pressure on the initial line. This is accomplished by increasing throttle as needed and further gating down initial line if needed.
- Increase relief valve operating pressure above third line desired pressure.
- Increase throttle while gating down the initial and second line pressures to reach desired pressures for all three lines.
- Set relief valve to 10 lbs. above highest pressure.

The second and initial line valves will be partially open, with the third line valve completely open.

Example B - Initial line at lowest pressure, second at highest, third at middle.

- **Charge initial line**, open valve completely and set to proper engine pressure.
- Set relief valve to 10 lbs above desired engine pressure
- **Charge second line**, open valve completely. (Both lines equal in pressure)
- Increase relief valve operating pressure above second line desired pressure
- Increase throttle while gating down first attack line to reach desired pressure for each line. The second line discharge valve should remain completely open and not be adjusted.
- Set relief valve to 10 lbs. above second line engine pressure.
- **Charge third line** by opening valve slowly to desired pressure while maintaining pressures on the other two lines. This is accomplished by increasing throttle as needed and further gating down initial line if needed.

The third line and initial line valves will be partially open, with the second line valve completely open.

Example C - Initial line at middle pressure, second lowest, third highest.

- **Charge initial line**, open valve completely and set to proper engine pressure.
- Set relief valve to 10 lbs. above desired engine pressure.
- **Charge second line** by opening valve slowly to desired pressure while maintaining pressure on the initial line. This is accomplished by minor throttle adjustment. The initial line valve should remain completely open and not be adjusted.
- **Charge third line**, open valve slowly to equal initial line pressure while maintaining pressure on the second line. This is accomplished by minor throttle adjustment.
- Increase relief valve operating pressure above third line desired pressure.
- Open third line valve completely. (Initial and third lines equal in pressure)
- Increase throttle to achieve desired third line pressure while gating down the initial and second lines to desired pressures.
- Set relief valve to 10 lbs. above third line engine pressure.

The second and initial line valves will be partially open, with the third line valve completely open.

Example D – Initial line at middle pressure, second highest, third lowest.

- **Charge initial line**, open valve completely and set to proper engine pressure.
- Set relief valve to 10 lbs. above desired engine pressure.
- **Charge second line**, open valve completely. (Both lines equal in pressure)
- Increase relief valve operating pressure above second line desired pressure.
- Increase throttle while gating down initial attack line to reach desired pressure for each line. The second line discharge valve should remain completely open and not be adjusted.
- Set relief valve to 10 lbs. above second line engine pressure.
- **Charge third line** by opening valve slowly while maintaining pressures on the other two lines. This is accomplished by increasing throttle and further adjusting initial line valve if needed.

The third line and initial line valves will be partially open, with the second line valve completely open.

Example E – Initial line at highest pressure, second lowest, and third middle.

- **Charge initial line**, open valve completely and set to proper engine pressure.
- Set relief valve to 10 lbs. above desired engine pressure
- **Charge second line** by opening valve slowly to desired pressure while maintaining pressure on the initial line. This is accomplished through minor throttle adjustment. The initial line valve should remain completely open and not be adjusted.
- **Charge third line** by opening valve slowly to reach desired pressure while maintaining pressures on other lines. This is accomplished through minor throttle adjustment and possibly gating down second valve further. The initial line valve should remain completely open and not be adjusted.

The second and third line valves will be partially open, with the initial line valve completely open.

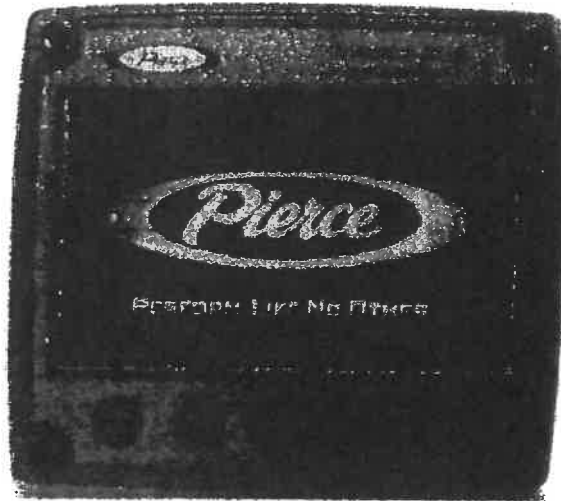
Example F – Initial line at highest pressure, second middle, and third lowest.

- **Charge initial line**, open valve completely and set to proper engine pressure.
- Set relief valve to 10 lbs. above desired engine pressure
- **Charge second line** by opening valve slowly to desired pressure while maintaining pressure on the initial line. This is accomplished through minor throttle adjustment. The initial line valve should remain completely open and not be adjusted.
- **Charge third line** by opening valve slowly to reach desired pressure while maintaining pressures on other lines. This is accomplished through minor throttle adjustment. The initial line valve should remain completely open and not be adjusted.

The second and third line valves will be partially open, with the initial line valve completely open.

3-22. Command Zone™ Information Center (CZIC) – Color Display

Figure 3-28: Command Zone™ Information Center (CZIC) – Color Display



POM0084

3-22.1 Items Common to All Screens

Caution and Warning Messages

Messages will appear in a text box at the top of all screens. The text box will not appear until a WARNING or CAUTION message is received. If a WARNING message is active, the box will be red. If a CAUTION message is active, the box will be yellow. If more than one message is active, the active messages will alternate every two seconds.

Time and Temperature

The time will be displayed in the upper left corner and the outside ambient temperature in the upper right corner.

Screen Navigation Buttons

Each color display is equipped with five buttons. The function of each button, located along the bottom of the color display, will change with each screen.

Basic Functions

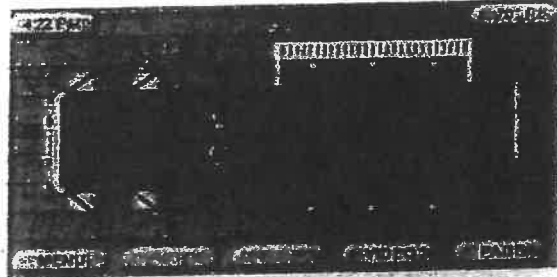
The MENU button will bring up a list of items for setting up the display or will allow maintenance personnel familiar with Command Zone™ electronics to access troubleshooting and analysis screens. See Setup/Diagnostics for additional information.

When the video function is enabled, a camera or "other video source" can be viewed by pressing the VIDEO button. The color display has an NTSC compatible video input. This is generally used with a backup camera.

The PAGE button will toggle through screens with information pertaining to the vehicle or apparatus. The screens vary, depending on the options and status of the vehicle.

3-22.2 Common Screens
Do Not Move Truck Screen

Figure 3-29: Do Not Move Truck Screen

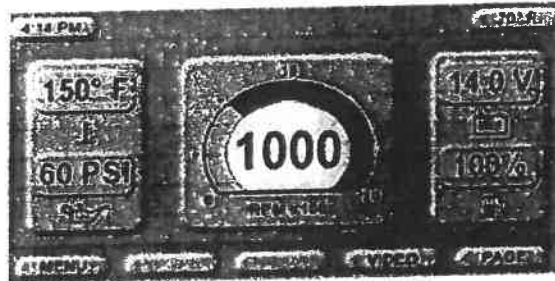


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The Do Not Move Truck screen (Figure 3-29) indicates the status of doors and other items that must be closed or stowed before moving the vehicle. This screen displays automatically when the "DO NOT MOVE TRUCK" warning message becomes active.

Engine Information Screen

Figure 3-30: Engine Information Screen

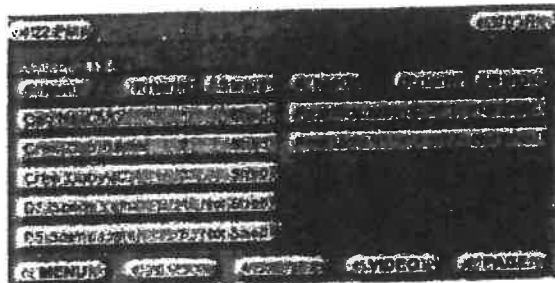


POM0086

The Engine Information screen (Figure 3-30) displays engine rpm, engine temperature, engine oil pressure, battery voltage, and fuel level. The color of the box containing the data will be GREEN when the data is within an optimal range, YELLOW when the data has entered a caution range, and RED when the data has entered a warning range.

Load Manager Screen

Figure 3-31: Load Manager Screen



POM0087

3-22.3 System Menu

Figure 3-34: System Menu



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The MENU button will bring up a list of items for setting up the display or will allow maintenance personnel familiar with Command Zone™ electronics to access troubleshooting and analysis screens. An indicator arrow to the left of the list can be moved by pressing the UP or DOWN button. Pressing the SELECT button will cause the selected screen to be displayed. If the parking brake is not set, the MENU button will need to be held for several seconds before it will activate.

3-22.3a Set Display Backlight

Figure 3-35: Set Display Brightness Screen

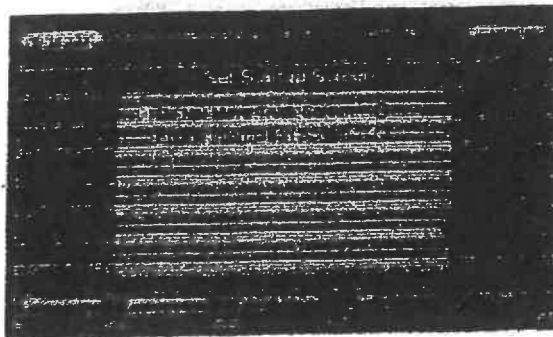


POM0091

When this button is selected, the operator will be allowed to change the brightness of the display by pressing either the UP or DOWN button. Separate adjustments are available for daytime and nighttime settings; press the DAY/NIGHT to toggle between the two settings. The value will be saved when pressing the BACK button.

3-22.3d Set Startup Screen

Figure 3-38: Set Startup Screen

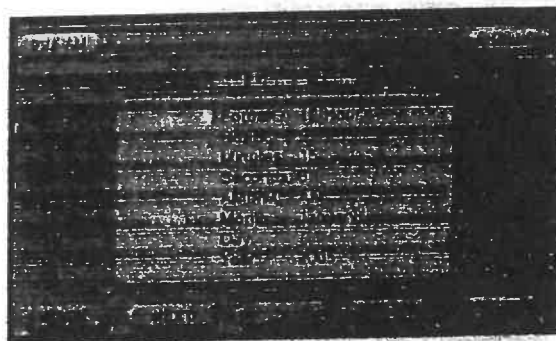


POM0093

Selecting this screen will bring up a menu of the default screens available (Figure 3-38). The selected screen will be displayed each time the truck battery switch is turned ON. To change the Startup screen, use the UP and DOWN buttons to scroll to a different screen name, then press the SAVE button.

3-22.3e Set Date and Time

Figure 3-39: Set Date and Time Screen



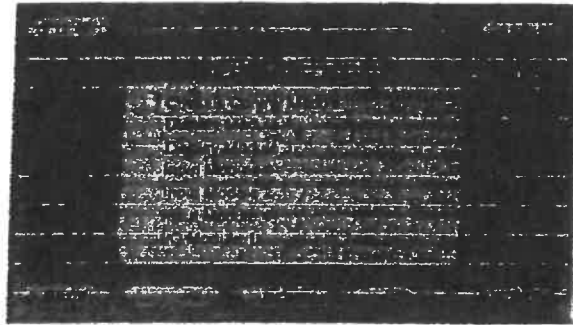
POM0094

Pressing this button will allow the operator to change the date and/or time, which are displayed at the top of each screen. Time can be displayed in standard or military format (12 or 24 hour). Pressing the NEXT button advances the indicator arrow to the next position. The "-" button will decrease the current value and the "+" button will increase the current value.

The System Information screen (Figure 3-42) is intended for system analysis and troubleshooting by operators or maintenance personnel who are familiar with Command Zone™ electronics. To the right of each item is the value of the data currently active on the system.

3-22.3i System Diagnostics

Figure 3-43: System Diagnostics Screen

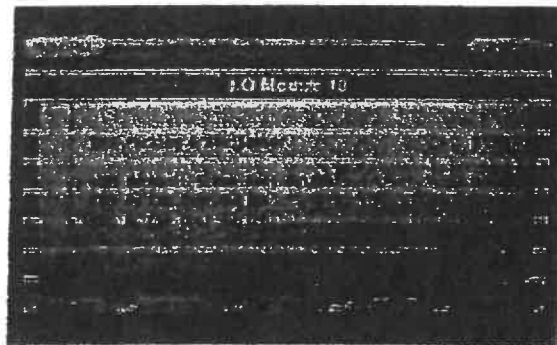


POM0097

The System Diagnostics screen (Figure 3-43) provides information for each of the Command Zone™ modules installed on the system. The screen lists the module type and module number of each module on the network. This is a "live" screen, meaning that if a module goes off line, the module will not be shown on this list and a warning message indicating the "Module Comm. Loss" will be displayed.

Module Screen

Figure 3-44: Module Screen



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If the user wishes to troubleshoot individual circuits within a given module, move the indicator arrow to the correct module name/number and press the ENTER button. The Module screen (Figure 3-43) will appear. The module name and number will appear at the top of the screen. The module's software version can be found to the right of the module name.