



Fire Protection Training

Procedures Handbook 4300

PUMPING

TOPIC: Relay Pumping Operations

TIME FRAME: 30 Minutes

LEVEL OF INSTRUCTION:

BEHAVIORAL OBJECTIVE:

Condition: A written quiz

Behavior: The student will list and describe the operations necessary to pump in a relay configuration.

Standard: With a minimum of 70% accuracy

MATERIALS NEEDED:

- Appropriate visual aids
- Audio visual equipment

REFERENCES:

- IFSTA, Water Supplies for Fire Protection, 4th Edition, Chapter 6
- Fire Fighting Apparatus and Procedures, Glencoe Press, 3rd Edition, pp. 287-315
- Fire Pump Operators Handbook, Isman
- IFSTA, Fire Stream Practices, 6th Edition, Chapter 5

PREPARATION: Relay operations become necessary when the fireground water supply is inadequate. The inability of an engine operator to recognize this inadequacy or initiate relay operations may lead to unnecessary loss of life and property.



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RELAY PUMPING OPERATIONS

| PRESENTATION | APPLICATION |
|--|-------------|
| <p>I. RELAY PUMPING</p> <p>A. Purpose</p> <ol style="list-style-type: none">1. Engines are placed at designated places along a supply line from the water source to the fire to boost pressure and provide adequate fire flows2. Pressure boosts may be necessary due to:<ol style="list-style-type: none">a. Weak water systemsb. Rise in elevationc. Excessive friction loss attributable to:<ol style="list-style-type: none">(1) Amount of water flowing(2) Size of hose used(3) Length of supply line3. Relay length is limited by<ol style="list-style-type: none">a. Number of engines availableb. Amount of hose availablec. Maximum rated pump capacity <p>B. Setting Up Relay Operations</p> <ol style="list-style-type: none">1. Engine #1 (source engine)<ol style="list-style-type: none">a. Position engine with largest pump at water source since this engine supplies greatest net engine discharge pressureb. Obtain water supplyc. Assist laying hose to engine #2 | |



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| <ul style="list-style-type: none">d. Advance pump throttle to designated relay pump pressuree. Simultaneously dump excess waterf. Discharge water through supply line when engine #2 (relay engine) is readyg. Simultaneously close the dump line or overboard discharge <p>2. Engine #2 (relay engine)</p> <ul style="list-style-type: none">a. Allow water from engine #1 to flow through dump line until all air is discharged from supply lineb. Engage pumpc. Adjust throttle to set designated relay pump pressured. Continue to dump water through dump line or overboard dischargee. Adjust dump line valve to limit residual intake pressure to 50 PSI throughout operation<ul style="list-style-type: none">(1) Fluctuations between 20 PSI and 100 PSI are acceptablef. Discharge water through supply line when engine #3 (relay engine or fire attack engine) is readyg. Simultaneously close the dump line or overboard discharge <p>3. Subsequent relay engines</p> <ul style="list-style-type: none">a. Repeat sequence outlined for engine #2 | |



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| <p>4. Attack engine</p> <ul style="list-style-type: none">a. When water reaches the attack engine, the operator opens bleeder valve to exhaust air in supply linesb. After air is exhausted, the intake valve is opened to establish the relay water supplyc. A dump line or overboard discharge must be provided to relieve excess pressure if an attack line is shut downd. Pump throttle is adjusted to supply adequate fire flows to all attack lines <p>5. All engines</p> <ul style="list-style-type: none">a. Once relay is operational and attack engine pressure is set, each engine must set the pressure relief valve or pressure governor at the designated pressure <p>C. Shutting Down Relay Operations</p> <ul style="list-style-type: none">1. Beginning with the attack engine and proceeding sequentially back to the source engine, each engine must:<ul style="list-style-type: none">a. Throttle pump downb. Open dump line valve or overboard dischargec. Disengage pump <p>D. Limitations On Relay Pumping Operations</p> <ul style="list-style-type: none">1. Total flow must not exceed rated flow of largest pump (source engine) | |



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| <p>2. Pressure pumped must not exceed pressure of last annual hose test</p> <p>a. 50 PSI safety factor should be subtracted for pressure surges</p> | |



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SUMMARY:

Relay pumping is a technique used to overcome insufficient fireground water supply. Set up requires time and additional resources. Since friction loss is the driving force behind these operations, consider using large diameter hose to reduce friction loss prior to resorting to relay operations.

EVALUATION:

A written quiz.

ASSIGNMENT:

To be determined by instructor(s).