Welcome to

Training

Last Updated: 28 January 2014
Kensington Volunteer Fire Department
Engine Delivery Training
Objective:

Upon the completion of the Pierce Pumper Delivery Program the operators will be able to identify components and safely operate the pumping apparatus and it’s associated equipment.
Section 1

Vehicle and Safety Information
Specifications

- Arrow XT custom chassis, Aluminum body
- GVW – 45,500 lbs.
- Length – 30’ 4”
- Height – 9’ 8”
- DDC DD13, 500 hp., EPA2013
- Allison 4000, 5 speed, w. aggressive downshift program
- Hale QMAX-150, 1,500 GPM, Stainless Steel
- Husky 12 foam system
- Hercules CAFS-200, PTO
- Water – 750 gal.
- Foam cell – 25 gal. Class A
- Fuel – 75 gal.
- DEF – 4.5 gal.
- Crew positions – 6
- Governed speed – 67 mph.
Fluid Fills

Diesel – 75 Gal.

DEF – 4.5 Gal.
## Vehicle Information Sticker

<table>
<thead>
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<th>Vehicle Information Sticker</th>
<th>Manufacturer: Pierce Manufacturing, Inc.</th>
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<td>GVWR</td>
<td>20,412 KG (45,000 LB)</td>
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<td>22.50x0.50</td>
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<tr>
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<td>827 KPa (120 PSI) DUAL</td>
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This vehicle conforms to all applicable U.S. Federal Motor Vehicle Safety Standards in effect on the date of manufacture shown above.

### Vin Numbers

- 4P1CE01U55A004957

### Paint Numbers

- Red: Pierce No. 90 Sikkens Autocure LV
- White: Pierce No. 10 Sikkens Autocure LV

### Fluid Capacities

<table>
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<tr>
<th>Device</th>
<th>Fluid Type</th>
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<tr>
<td>Engine</td>
<td>Series 40</td>
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<tr>
<td>Trans</td>
<td>3066 EVS</td>
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</tr>
<tr>
<td>Power Steering</td>
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### Fluid Types

- Front Axle: 17.5 Liter 18W40 CL-4
- Rear Axle (4 or Single): 18.0 Liter 60W90 GEAR LUBE
- Rear Axle (6 or): 0.0 Liter NA
- Cab Tilt: 3.8 Liter 60W90 GEAR LUBE
- Gen Harrison - 6 kW: 28.4 Liter 60W90 GEAR LUBE
- T-Case: 0.0 Liter NA
- Equipment Rack - Per Reservoir: 0.0 Liter NA
- Comp: 0.0 Liter NA
- Water Pump Transmission: 12.3 Liter DEXRON III
- Water Pump Priming: 0.0 Liter DEXRON III

### Device

- Engine
- Trans
- Coolant
- Power Steering
- Front Axle
- Rear Axle (4 or Single)
- Rear Axle (6 or)
- Cab Tilt
- Gen Harrison - 6 kW
- T-Case
- Equipment Rack - Per Reservoir
- Comp
- Water Pump Transmission
- Water Pump Priming

### Fluid Capacities

- Engine
- Trans
- Coolant
- Power Steering
- Front Axle
- Rear Axle (4 or Single)
- Rear Axle (6 or)
- Cab Tilt
- Gen Harrison - 6 kW
- T-Case
- Equipment Rack - Per Reservoir
- Comp
- Water Pump Transmission
- Water Pump Priming

### Fluid Types

- Engine
- Trans
- Coolant
- Power Steering
- Front Axle
- Rear Axle (4 or Single)
- Rear Axle (6 or)
- Cab Tilt
- Gen Harrison - 6 kW
- T-Case
- Equipment Rack - Per Reservoir
- Comp
- Water Pump Transmission
- Water Pump Priming

### Fluid Capacities

- Engine
- Trans
- Coolant
- Power Steering
- Front Axle
- Rear Axle (4 or Single)
- Rear Axle (6 or)
- Cab Tilt
- Gen Harrison - 6 kW
- T-Case
- Equipment Rack - Per Reservoir
- Comp
- Water Pump Transmission
- Water Pump Priming

### Fluid Types

- Engine
- Trans
- Coolant
- Power Steering
- Front Axle
- Rear Axle (4 or Single)
- Rear Axle (6 or)
- Cab Tilt
- Gen Harrison - 6 kW
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- Comp
- Water Pump Transmission
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- Water Pump Transmission
- Water Pump Priming
Safety Equipment

- Anti lock brakes (ABS)
- Automatic Traction control (ATC)
- Electronic Stability control (ESC)
- Auxiliary Braking systems
  - Compression brake (Jacobs)
- Pierce recommendation – “When road conditions dictate that a driver change his/her driving pattern, the driver should disable auxiliary braking systems.”
- Front Impact Protection Package
- Side Roll Protection Package
Knee Bolster Airbag – Officers side only

Do not hang and/or place anything in front of airbag
Side Roll Protection

- It is a supplemental restraint system
- Side roll will **not** operate in all crashes
- If system is activated, must be repaired by Pierce
Section 2

Cab Controls
Cab Controls

- **Battery Switch**
  - On position

- **Ignition and Start Button.**
  - Transmission in neutral.
  - Parking brake must be engaged.
Starting Procedure

1. Battery switch ON
2. Ignition switch ON, wait for ignition PROVE OUT to complete 4-5 sec.
3. Start engine
4. Shut OFF engine using Ignition switch, leave Ignition OFF
5. Shut Battery switch OFF
Cab Controls

Gauges and Warning Lamps

- Tachometer
- Speedometer

Display Modules

- Coolant Temperature
- DEF level
- Oil pressure
- Transmission Temperature
- Voltage
- Front Air Pressure
- Rear Air Pressure
- Fuel

Pierce
Transmission Control

**NOTE:** Must have MODE button activated for Aggressive Downshift to activate
Transmission Fluid Check using shifter keypad

- Transmission must be in neutral, fluid temp 140-220 F
- Engine at idle.
- Vehicle motionless for 2 minutes

Push both arrow buttons simultaneously, release

Read codes in windows

“o L”, “oK” – Fluid level OK
“oL”, “Lo”, “02” – Fluid level low 2 quarts
“oL”, “HI”, “01” – Fluid level 1 quart high
Cab Controls
Cab Controls

Pump Shift
Cab Controls

Regeneration
Cab Controls

Switch panels - DS
Cab Controls

Switch panels - OS
Heat and A/C
Section 3

Pump Panel Controls
Pump Panel -DS
Pump Panel -OS
Pump Panel

Master Intake and Pump Discharge Gauges

Test Gauge Ports
Pressure Control

Pressure Governor

- Preset
  - Pressure: 150 psi
  - RPM: 1,000
Pump Panel

- Engine cooler valve
- Tank level Gauge
- Primer Valve
Foam Controls
Husky 12
Pump Panel

Foam/CAFS Discharge Valves and Gauges

Foam/CAFS capable lines
2 crosslays (1-3/4” 200’)
Officers rear inboard discharge (2” 250’)

Pierce
System Capabilities

- 200 GPM @ 6%
- 400 GPM @ 3%
- 1,200 GPM @ 1%
- 2,400 GPM @ 0.5 % *
- 4,000 GPM @ 0.3 % * (**)

At system pressures up to 250 PSI

* Piping limitations may alter these numbers
** Normal concentration for Class A foam
Engage water pump (Engages foam system PTO)
Open tank to pump valve
Open discharge(s)
Turn on foam system (Red Button)
When completed, turn off foam system
Flow discharges until mostly clear of bubbles
Disengage water pump
Other functions
Class A Foam – External Pickup

- Connect pickup tube, foam container
- Engage water pump, open tank to pump valve
- Push “PAGE” until “Select Mode” page appears
- Up/Dn arrow to “Select Foam Source” , push “Enter”
- Up/Dn arrow to “Draft Class A”, push “Enter”
- Open discharge(s) or manifold drain
- Turn on foam pump (Red Button)
- Set Foam Percentage (if needed)
- Push and hold “Prime” (if needed)
Class B Foam – External Pickup

- Connect pickup tube, foam container
- Engage water pump, open tank to pump valve
- Select mode as per Draft Class A
- Open discharge(s) or manifold drain
- Turn on Foam pump (Red button)
- Set Foam Percentage (if needed)
- Push and hold “Prime” (if needed)
- Flush system when completed
Onboard Tank Fill

“CHECK SELECTOR VALVE”

Pickup tube

Foam Selector Valve
Foam Controls

- For CAFS:
  - Compressor switch to ON
  - Switch at discharge to ON
  - Manual/Auto switch should always be set to **Auto**.
Hose Loads

- (1) 100’ 1-3/4” bumper line
  - 15/16” smoothbore breakaway with 75psi fog nozzle

- (2) 200’ 1-3/4” Crosslays preconnect (Foam Solution/CAFS capable)
  - 15/16” smoothbore breakaway with 75psi fog nozzle

- (1) 400’ 1-3/4” Drivers side preconnect
  - 15/16” smoothbore breakaway with 75psi fog nozzle
  - 100’ Minuteman Shoulder Load (Nozzle Man)
  - 150’ Minuteman Shoulder Load (Backup/Officer)
  - 150’ Flat Load (Driver)

- (1) 350’ 3” Flat Load with gated wye
  - Loops at every 100’

- (1) 800’ 4” Flat Load

- (1) 1,000’ 4” Flat Load connected to Humat

- (1) 250’ 2” preconnect (Foam Solution/CAFS capable)
  - 15/16” smoothbore breakaway with 75psi fog nozzle

- (1) 250’ 2-1/2” stack-tip smoothbore
Hose Loads – Packing Bumper Line

- **100’ 1-3/4” bumper line**
  - Connect 50’ section to swivel
    - Pack in front of tray making two loops on initial pass.
    - Flat pack remainder.
  - **Donut roll with male coupling on inside**
    - Connect nozzle
    - Place in rear of tray
    - Connect female to initial 50’
Hose Loads – Packing 400’

- **150’ flat load Drivers Load**
  - Ear on second fold
  - Full length of bed

- **150’ modified MinuteMan Middle Load**
  - Place male coupling on ground and then load remainder of hose on top
  - 2/3 length of bed
  - Connect Drivers Load male to Middle Load female
  - Push hose load into bed until it stops

- **100’ MinuteMan Shoulder Load**
  - Do not wrap nozzle
  - Place nozzle flush with edge of hose bed with bail towards drivers side
  - Connect Middle Load male hanging over tailboard to Shoulder female
Hose Loads – 400’
Pump Inlets & Soft Sleeves

• **Front Intake**
  - 5” with a 4” Stortz connection with 20’ 4” soft sleeve.
  - Hydrant-Stortz adapter
  - 2-1/2” to 4” Stortz gate
  - Hydrant wrench
  - Mallet

• **Rear Intake – behind roll up door**
  - 5” with a 4” Stortz connection with 20’ 4” soft sleeve.
  - Hydrant-Stortz adapter
  - Hydrant wrench
  - Mallet

• **Side Intakes**
  - 6” with 4” Stortz connection
  - Officer side hose tray has 1 section of 50’ of 4”
  - Drivers compartment behind pump panel has 2 sections of 25’ of 4”
Section 4

Accessory Controls

*Cab Lift*
Caution: Before raising any Pierce cab, ensure that all items on the front bumper have adequate clearance when the cab is tilted.
Cab Tilt Controls

Arrow XT

Pump Activate Switch

Control – Raise / Lower

WARNING: Before raising cab, remove all loose items from the cab as contents may shift.

CAUTION: Check bumper extension to ensure covers are down and plumbing swivels are facing forward.

CAUTION: Ensure vehicle is on flat ground to avoid interference with components.
Cab Tilt Operation

*Arrow XT*

**Raising**

- Battery and ignition “ON”, parking brake set
- Control in raise position
- Press activate switch
- Stay arm engaged
- Lower cab to bed stay arm

**WARNING:** Never work under cab unless stay arm or cab support is in place
Lowering

**WARNING:** Before lowering cab, be sure all personnel and equipment are clear of the cab area

- Battery and ignition “ON”, parking brake set
- Turn control to “raise” and activate pump
- Raise cab
- Secure stay arm
- Control switch to “lower”
- Push activate button
- Ensure cab is down (3 count)
Additional Features

Make-up Air Compressor (12v)

Rear Inlet

Shoreline powered 110vac outlet in EMS compartments
Section 5

PUMPS
Positioning and Operation
Pumping Operations

Engaging the Driveline pump

- Stop and shift to neutral
- Set brake
- Apply service brake
- Engage pump shift “down”
- Check "pump engaged” light
- Shift to drive
- Check speedometer
- Check "ok to pump” light
- Conditions for “ok to pump” light
- Set wheel chocks

**CAUTION:** Begin pumping right away and/or circulate water to keep pump from overheating

**CAUTION:** Running the pump dry for more than a few minutes will cause damage
Manual Pump Shift

- Transmission in NEUTRAL, parking brake applied
- Foot on brake pedal
- Move pump shift lever to middle position
- Pull manual pump shift handle out
- Move pump shift lever to lower position
- Place transmission in DRIVE
Pumping Operations

**Water Supply**

- **Drafting**
  - Always 20 Hg. of vacuum or less
  - Intake vacuum of more than 20 Hg. can cause cavitation

- **Hydrant**
  - Maintain intake pressure above 20 psi
  - Provides safety factor for water system
  - Intake pressure must be 20 psi below discharge pressure for governor to work properly

- **Consult department SOP/SOG’s**
Pumping Operations

Controlling with Pressure Governor

- Governor will maintain PSI/RPM’s automatically
- To operate:
  - Select mode
  - Adjust by using “increase/decrease” control
- Throttle mode: operates manually
- Preset: automatically goes to preset PSI/RPM (150psi/1,000rpm)
- Low water/No water protection

**WARNING:** Apparatus equipped with pressure governors normally do not have pressure relief valves. The pressure governor performs the function of the relief valve, always pump in pressure governor mode.

Pumping in throttle mode can cause high pressure and/or pressure spikes. Pressure spikes can injure or kill.
Pump Operations

Disengaging the Driveline Pump

- Reduce engine speed and/or disengage pressure governor
- Shift transmission to neutral
- Speedometer must drop to 0 and then shift to “road”
- Observe indicator lights, if both off, shift is successful, if not repeat procedure.
Section 6

Maintenance and Care
If it necessary to idle engine for more than FIVE minutes, the high-idle switch should be activated to increase the engine speed to at least 1000 RPM.
Vehicle Checks

- Oil & Transmission Fluid
- Coolant Expansion Tank
- Radiator Sight Glass
- Alternate Fluid Check Access
- Power Steering Reservoir
- Windshield Washer Reservoir
Vehicle Checks — con’d.

Circuit Breaker Panel  
Vogel Lube  
Front Axle Hubs

Cab Lift Reservoir  
Air Tank Drains (4)  
Accessory Drive Belts
Front Brake Check

Front brake pad wear indicator

- If the indicator shows more than 75% wear: The pads require further inspection or replacement. Refer to Section 4.
Regional Concerns

- **Heat**
  - Properly maintain the cooling system
  - Utilize auxiliary cooler when necessary
    - Use with caution in cold temperatures
  - Remove leaves from radiator in the fall
Regional Concerns

- **Cold Conditions**
  - Engine may not reach warm operating temperatures unless under load

  *Caution:* As a result of not reaching operating temperature, operating a diesel engine at low idle for extended periods of time can result in engine damage.

  *Caution:* Avoid extended idling (beyond 5 min. when possible)

  *Caution:* Use a minimum 45 Cetane diesel fuel

  *Caution:* Maintain a minimum of 1250 RPM idle

- **Remember:** Water freezes, and can cause major pump and accessory damage
Care of Vehicle

- **Washing**
  - Can be washed any time after delivery
  - Use mild non-abrasive liquid soap made for vehicles
    - **DO NOT USE DISH SOAP**
  - Avoid pressure washing

- **Waxing**
  - May be hand waxed 90 days after delivery

*Caution:* Do not wax any of the Goldstar, gold leaf, or other vinyl. Wax around it (refer to owners manual)
### Tire Inflation Chart

**MAINTENANCE**

Table 4-9 is for Michelin® tires only. Refer to the tire data book that matches the brand of tire on your vehicle or contact a Pierce Customer Service Representative for this information.

#### Table 4-9: Tire Data Chart

**WHEEL DIAMETER - 22.5”**

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<th>LBS</th>
<th>75</th>
<th>80</th>
<th>85</th>
<th>90</th>
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**12R22.5 LRH - ALL TIRES**

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(1) Except 12R22.5 XDN2448 (D)

315/80R22.5 LRL - ALL TIRES

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385/65R22.5 LRL - ALL TIRES

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425/65R22.5 LRL - ALL TIRES

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445/65R22.5 LRL (1) - XLZ™

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445/65R22.5 LRL (2) - XZY®

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S = Single configuration — 2 tires per axle
D = Dual configuration — 4 tires per axle

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Custom Chassis / 4-27
2013 Spec Engines

Regeneration & DEF
Questions?