



## Presents

**HYDRAULICS !      HYDRAULICS!      HYDRAULICS!**

April 12

April 13

April 14

### Three 1-Day Course

**Sample of course outlines included**

#### Day 1: Basic Hydraulic Review

Twenty things to know about hydraulic systems  
 Open center, fixed displacement pump, constant flow systems VS.  
 closed center, variable displacement pump constant pressure systems  
 Reading Hydraulic Schematics

#### Day 2: Aerial Device Hydraulic Systems

##### THREE BASIC SYSTEMS

- Constant flow systems - fixed displacement pumps
- Constant pressure systems - pressure compensated pumps
- Accumulator/closed center vs. pressure compensated/closed center

##### DIRECTIONAL CONTROL VALVES

- 3 position/4 way
- 3 position/3 way
- 2 position/4 way
- 2 position/3 way
- Open center/open port
- Closed center/closed port
- Float position & motor spools
- Power beyond

**Students are encouraged to bring machine hydraulic Schematics for analysis**

#### Day 3: Refuse & Waste Equipment Hydraulics

##### HYDRAULIC PRINCIPLES

Flow/pressure relationship • Pascal's Law/Bernoulli Principle  
 • Restrictions/Pressure Drop/Heat/Power Loss

##### PUMP/VALVE COMBINATIONS

- Constant flow, fixed displacement pump, open center systems  
 Advantages and disadvantages
- Constant pressure, variable displacement pump, closed center systems  
 Advantages and disadvantages

##### FLOW AND PRESSURE CONTROL

Flow control valve types  
 Function and construction  
 Pressure control valve types  
 Function and construction  
 Understanding pilot operation

**Students should bring trouble shooting problems for discussion**

#### DATE:

April 12, 13 & 14, 2011

#### TIME:

7:00 – 3:00 pm

#### LOCATION:

SRP  
 Foot Hills Facility  
 7211 South 16 Street  
 Phoenix, AZ

#### COST:

1-Day: \$185.00  
 2-Days: \$350.00  
 3-Days: \$475.00

#### Includes:

Class workbook,  
 Mobile Hydraulic CD,  
 Fluid Power Data Book,  
 Certificate of Completion

#### CONTACT:

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#### **INSTRUCTOR BIO: George Lonner**

George Lonner has degrees from Georgetown University, University of Minnesota and Case Western Reserve University, (Diplomat Mechanical Engineering). He has taught at Gonzaga University, Whitworth College, Auburn University and Washington State University. Mr. Lonner has over 50 years of field and in-plant fluid power experience, including 20 years with Parker Hannifin, where he was responsible for developing company activities in Africa, the Middle East, Latin American and the Caribbean. Since founding FPTA, LLC in 1980, Mr. Lonner has taught over 1000 fluid power training programs worldwide. Mr. Lonner is a certified Fluid Power Instructor and Consultant.