



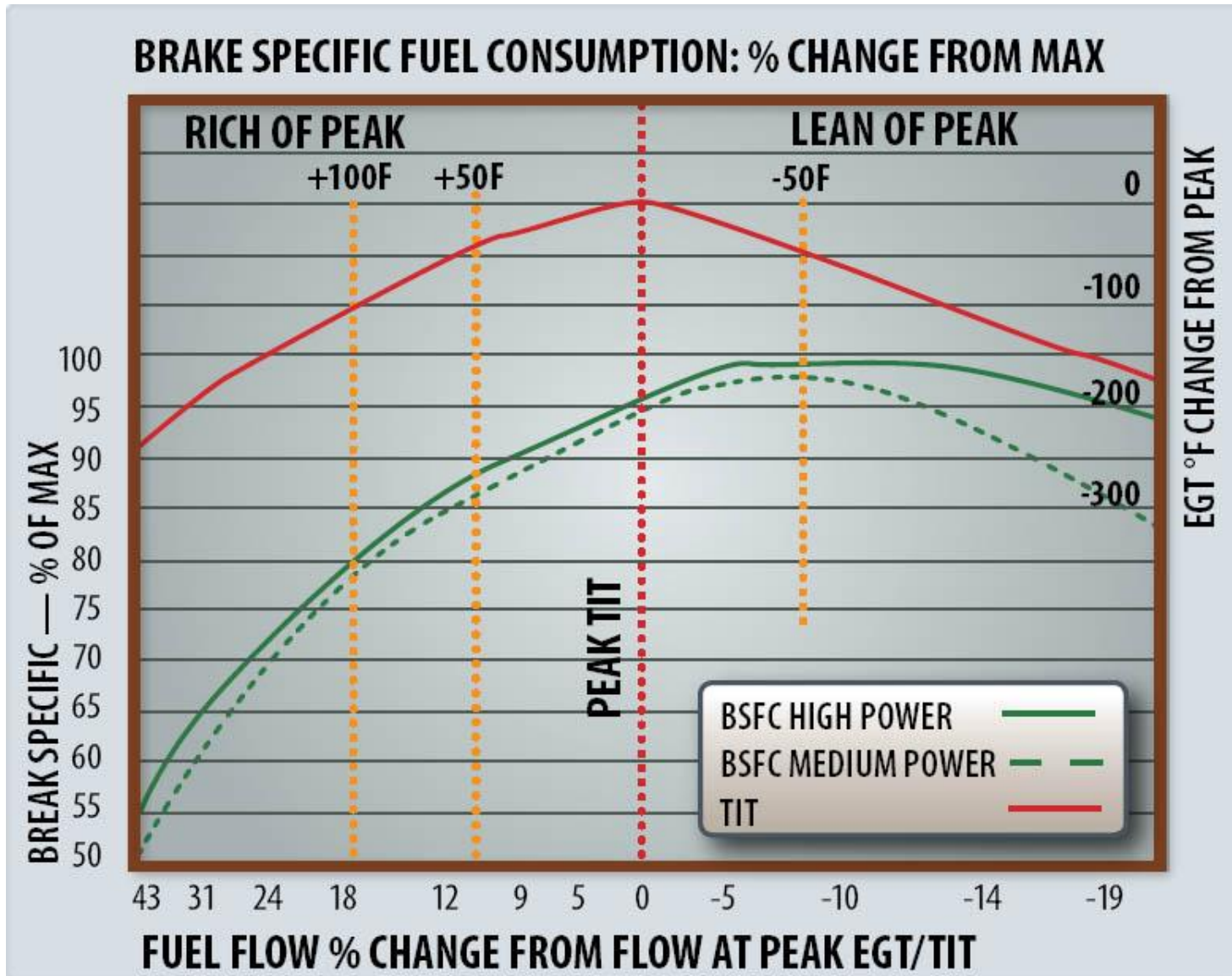
## INTRODUCTION

- Randy Porter, Owner
- Started Flying Wrench in July 2008
- Former Air Force Senior Airman
- 30 years of aircraft maintenance experience
- Offer complete maintenance on smallest repairs to major overhauls
- JPI & GAMInjector Dealer
- Restoring 1958 Beech Bonanza

# Lean-of-Peak Overview

- What is Lean-of-Peak?
- How Lean?
- Misconceptions
- Steps
  - Equipment needed
  - Baseline flight
  - Adjustment
- Cost
- Questions

# What is Lean-of-Peak



# Misconceptions

- Fuel Injected vs. Carbureted Engines
- Turbocharged vs. Normal aspirated
- Fuel savings doesn't cover installation cost
- Burnt Valves
  - CFI Primary Training
  - Pilot Operating Handbook (POH)

MIXTURE DESCRIPTION	EXHAUST GAS TEMPERATURE
RECOMMENDED LEAN (Pilot's Operating Handbook and Power Computer)	50°F Rich of Peak EGT
BEST ECONOMY (65% Power or Less)	Peak EGT

Figure 4-4. EGT Table

Economy Mixture Indicator may be used as an aid for mixture leaning in cruising flight at 75% power or less. To adjust the mixture, using this indicator, lean to establish the peak EGT as a reference point and then enrichen the mixture by a desired increment based on data in figure 4-4.

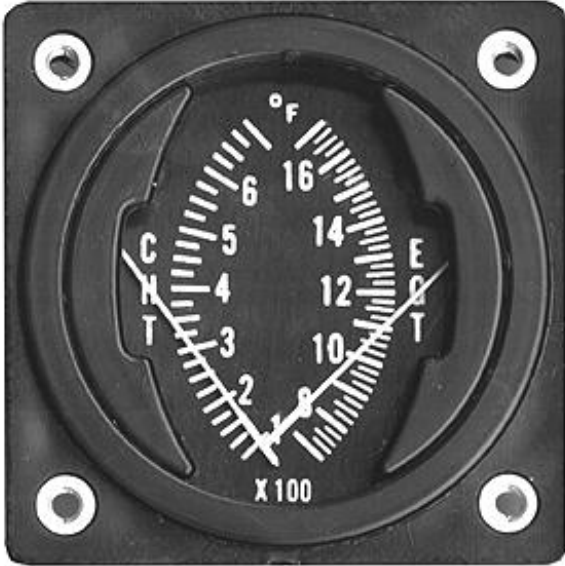
Continuous operation at peak EGT is authorized only at 65% power or less. This best economy mixture setting results in approximately 5% greater range than shown in this handbook accompanied by approximately a 3 knot decrease in speed.

**NOTE**

Operation on the lean side of peak EGT is not approved.

When leaning the mixture under some conditions, engine roughness may occur before peak EGT is reached. In this case, use the EGT corresponding to the onset of roughness as the reference point instead of peak EGT.

Stock engine temperature monitoring gauges are inadequate



Need a Graphic Engine Monitor (GEM)

# Three Step Process

1. Install Graphic Engine Monitor (GEM) and GAMInjectors
2. Test flight to gather baseline data
3. Modify GAMInjector size based on data
  - Hotter cylinders reduced the size
  - Cooler cylinders increase the size
  - Size range: 5/1000” – 10/1000”

# STEP 1

- Install Graphic Engine Monitor (GEM)
- Multiple products on the market:
  - JPI
  - Dynon
  - XYZ Brand
- Install Injectors
  - GAMI
  - XYZ Brand

# JPI EDM 700



4-Cylinder



6-Cylinder



9-Cylinder





## Fuel Injected Engines

- Atomize fuel and air
- Diameter determines flow rate

## GAMIjectors

- Yield smoother operations
- More even leaning
- Price range \$700-\$900



# STEP 2



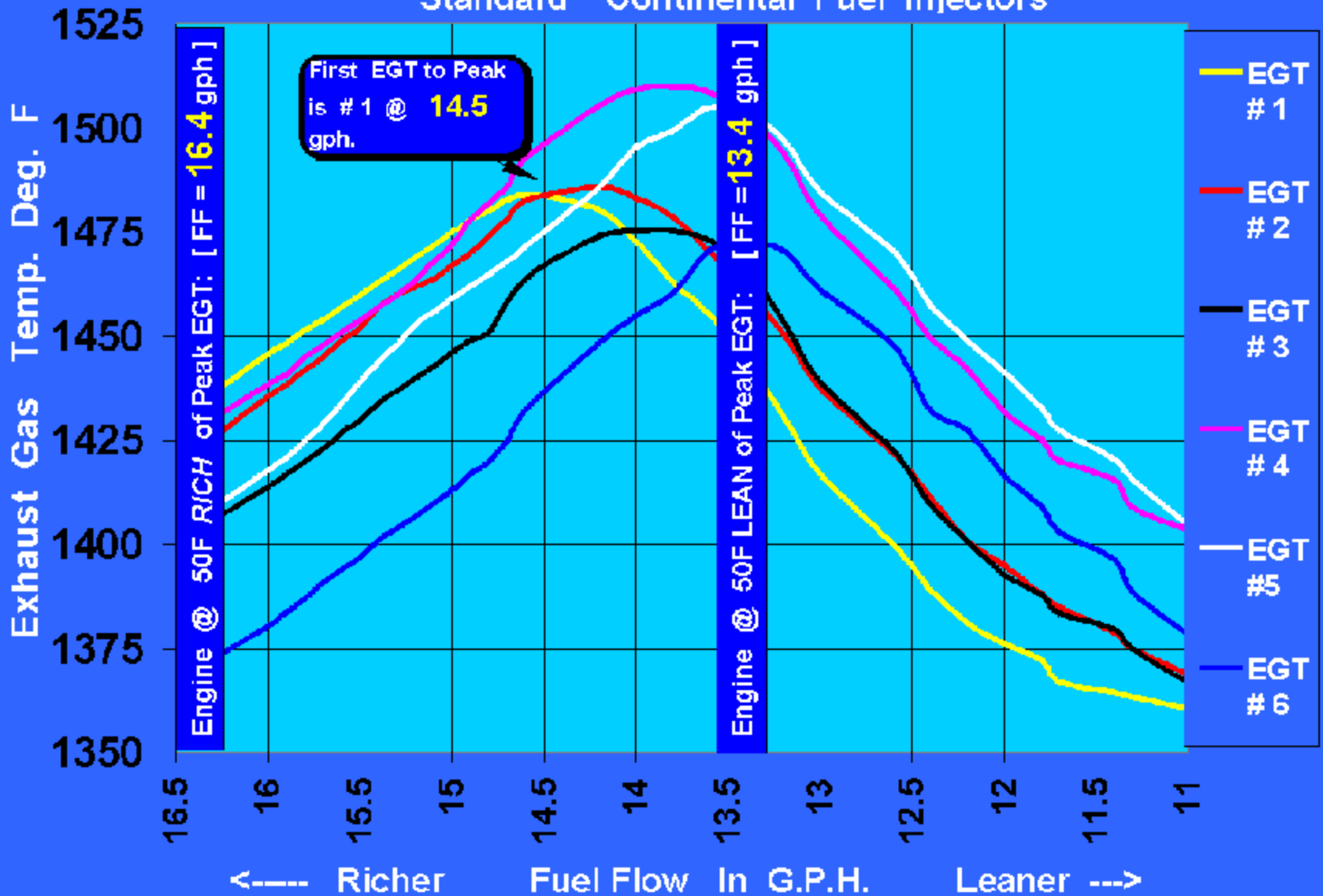
- Test flight to gather baseline data
- Ideal is IAS is stable throughout flight



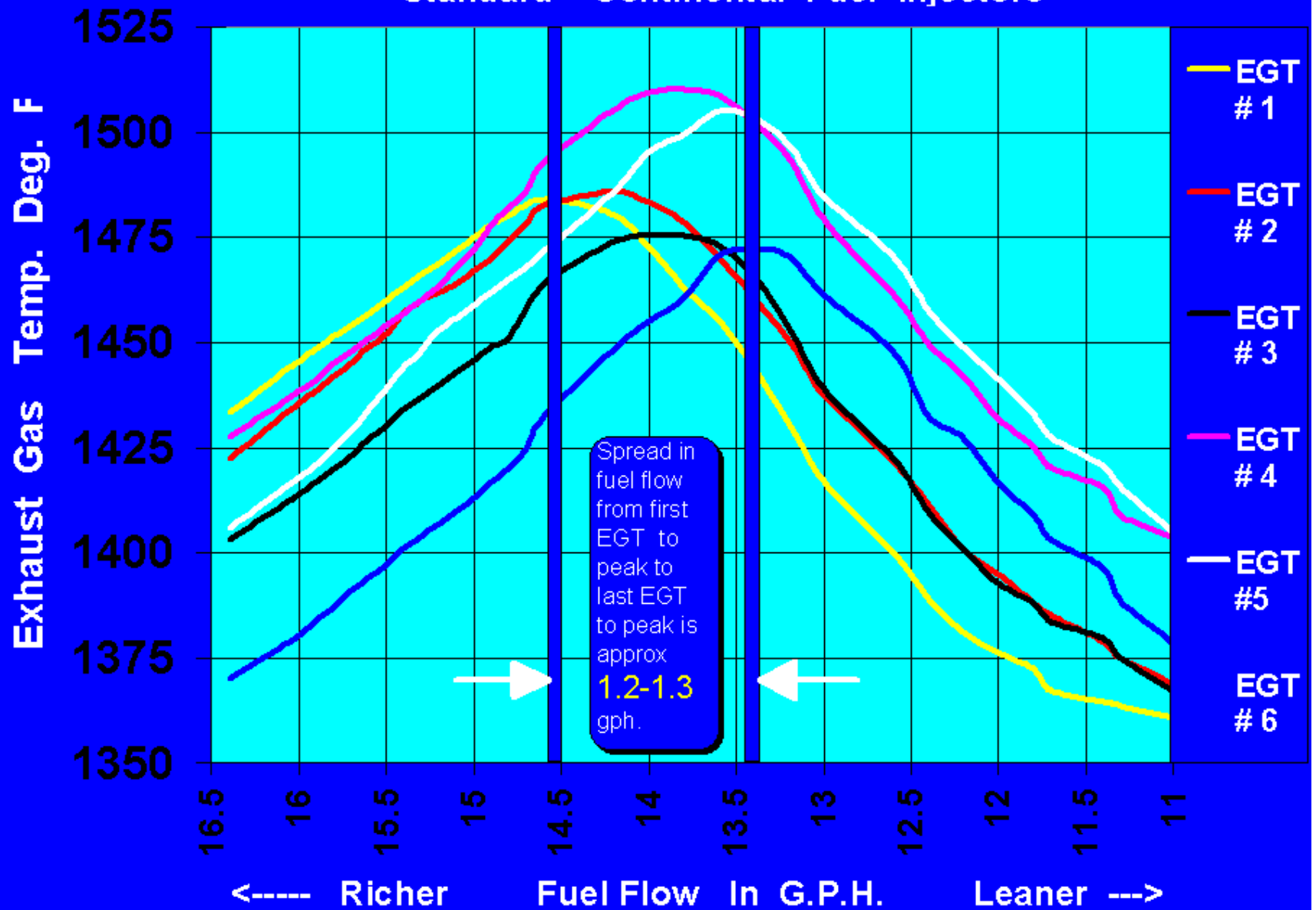
# Baseline Flight Test Example: Cessna T-210

GHP	EGT 1	CHT 1	EGT 2	CHT 2	EGT 3	CHT 3	EGT 4	CHT 4	EGT 5	CHT 5	EGT 6	CHT 6	TIT	IAS
15.8	1408	302	1408	329	1432	357	1449	344	1419	354	1438	312	1481	40
15.6	1417	303	1421	331	1442	357	1464	346	1432	354	1447	313	1500	40
15.4	1429	305	1432	333	1453	359	1474	351	1438	359	1462	320	1517	40
15.1	1438	321	1438	346	1466	373	1485	365	1451	368	1472	333	1525	40
14.8	1453	323	1453	346	1472	372	1489	362	1462	368	1483	331	1536	40
14.5	1464	325	1464	346	1487	372	1500	360	1474	370	1489	329	1547	40
14.2	1481	326	1470	346	1493	373	1493	357	1485	370	1485	328	1551	40
13.7	1489	323	1455	338	1485	367	1481	351	1481	365	1466	321	1538	40
13.4	1474	302	1436	318	1464	344	1466	331	1466	354	1453	300	1515	39
13.0	1470	398	1428	308	1455	338	1455	323	1455	344	1436	394	1500	38
12.8	1462	395	1421	307	1449	334	1450	320	1440	341	1430	292	1489	38
12.6	1455	290	1415	307	1445	333	1442	315	1436	339	1428	287	1485	38

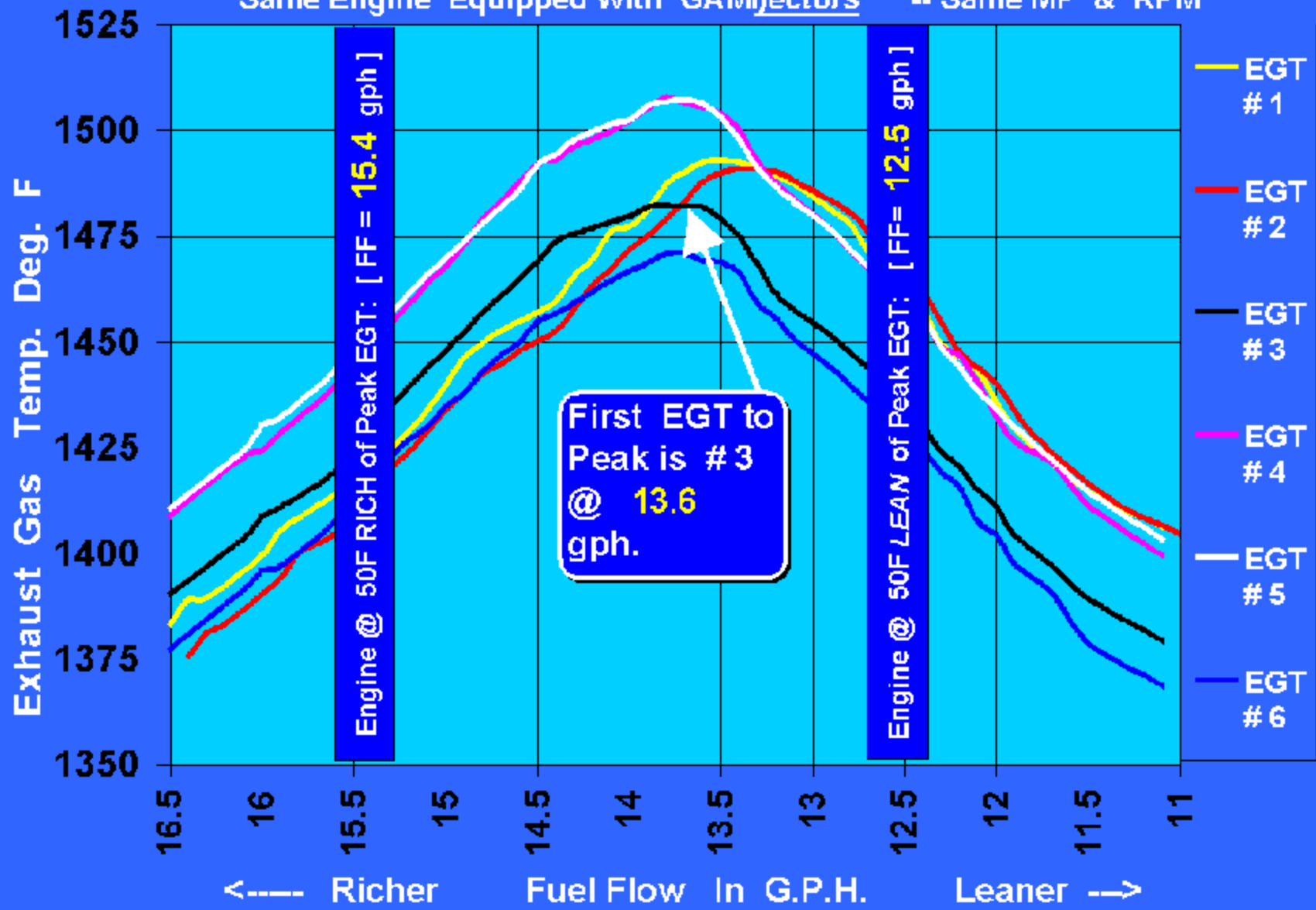
# Standard Continental Fuel Injectors



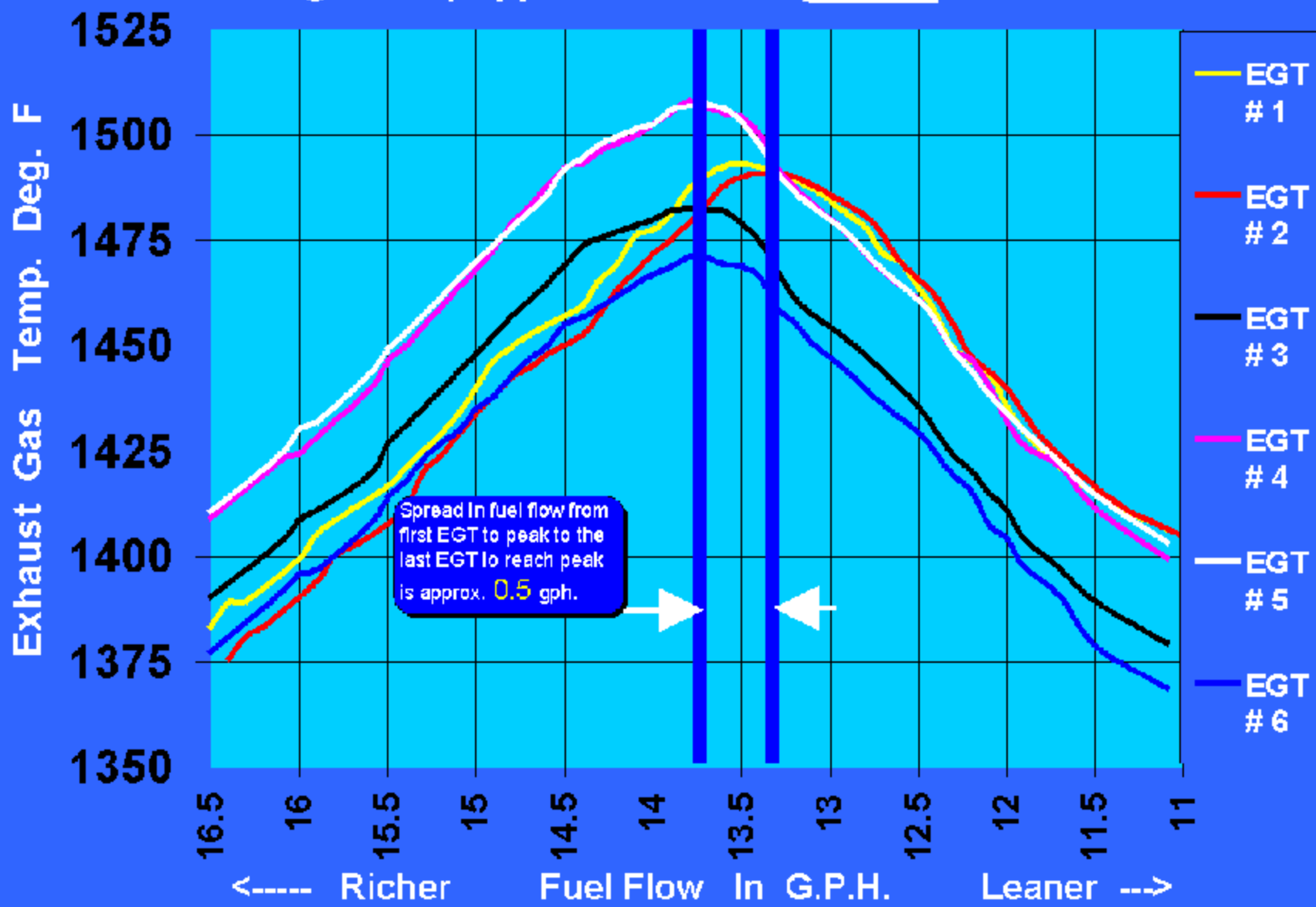
# Standard Continental Fuel Injectors



Same Engine Equipped With GAMjectors™ -- Same MP & RPM



# Same Engine Equipped With GAMIjectors<sup>TM</sup>-- Same MP- RPM



# Review: Three Step Process

1. Install Graphic Engine Monitor (GEM) and GAMInjectors
2. Test flight to gather baseline data
3. Modify GAMInjector size based on data
  - Hotter cylinders reduced the size
  - Cooler cylinders increase the size
  - Size range: 5/1000” – 10/1000”

**GOAL: EGT to peak at the same fuel flow  
(2/10 - 5/10/gallon range)**

# Advantages

- Cooler Cylinder Head Temperatures (CHT)
- Higher Time Between Overhaul (TBO)
- Better fuel efficiency (1.5-3.0 gal/hour)
- It pays for itself (Average system \$2500):
  - \$5.00/gal x 1.5 gallon = \$7.50 (333 hours)
  - \$5.00/gal x 3.0 gallon = \$15.00 (166 hours)

# Questions