GTA Fuel Enhancer

Results of testing by John Satterfield

Dynamometer Test Program

GTAT hired John Satterfield*, an expert in air and fuel flow in racing engines, to design and carry out dynamometer tests to determine the effect of GTAT's fuel additive on the performance of a racing fuel in a high compression engine.

Satterfield created two protocols. The first was to test the performance of a fuel under transient load. The second was to test a fuel under constant non-variable load. Each protocol was designed to subject the fuel to extreme thermal and pressure conditions.

***See John Satterfield's company web site at: http://dambest.com/**

Protocol #1

To carry out Protocol #1 John Satterfield built a computer controlled throttle rig which automatically retarded the throttle position from 100% to 50% in 20 seconds. The dyno run began with the engine at wide open throttle and 5300 RPM.

The test was started when the computer began reducing the throttle. The dyno held the RPM at 5300. The result was a rapid transition to high load when the throttle was reduced, with the load decreasing with throttle position. Horsepower, and air and fuel flows were measured for each run.

Protocol #2

In the second protocol the engine was run at wide open throttle under constant, non-variable load. Runs were made at ignition timing settings of 32 degrees, 36 degrees, 42 degrees, 46 degrees and 50 degrees before top center.

Data was taken at the end of the run when thermal and pressure loads were at maximum. RPM, horsepower, and fuel and air flow were measured.

The test engine used in both protocols was a Chevrolet with a displacement of 315 cubic inches and a stroke of 3.10 inches.

The fuels used in the tests were:

(1) VP Red/105 octane

Distillation

10% evap	**@ 170.0^{o}F**
50% evap	**@ 218.0^{o}F**
90% evap	**@ 304.0^{o}F**
E.P.	**@ 392.0^{o}F**

and…….

(2) VP C-12/108 octane

Distillation

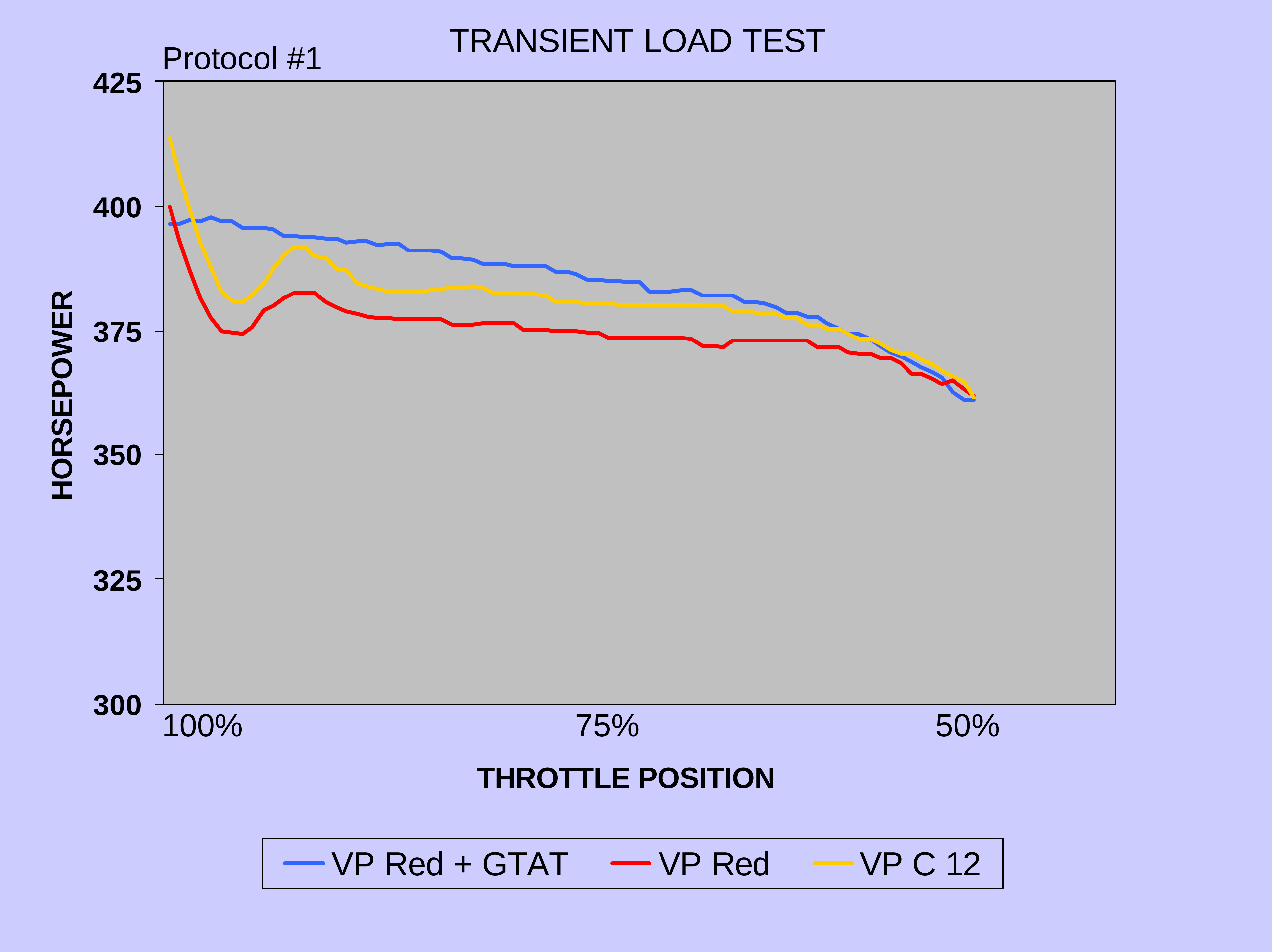
10% evap	**@ 131.0^{o}F**
50% evap	**@ 194.0^{o}F**
90% evap	**@ 228.0^{o}F**
E.P.	**@ 233.3^{o}F**

and……..

(3) VP Red/105 octane, treated with GTAT's additive.

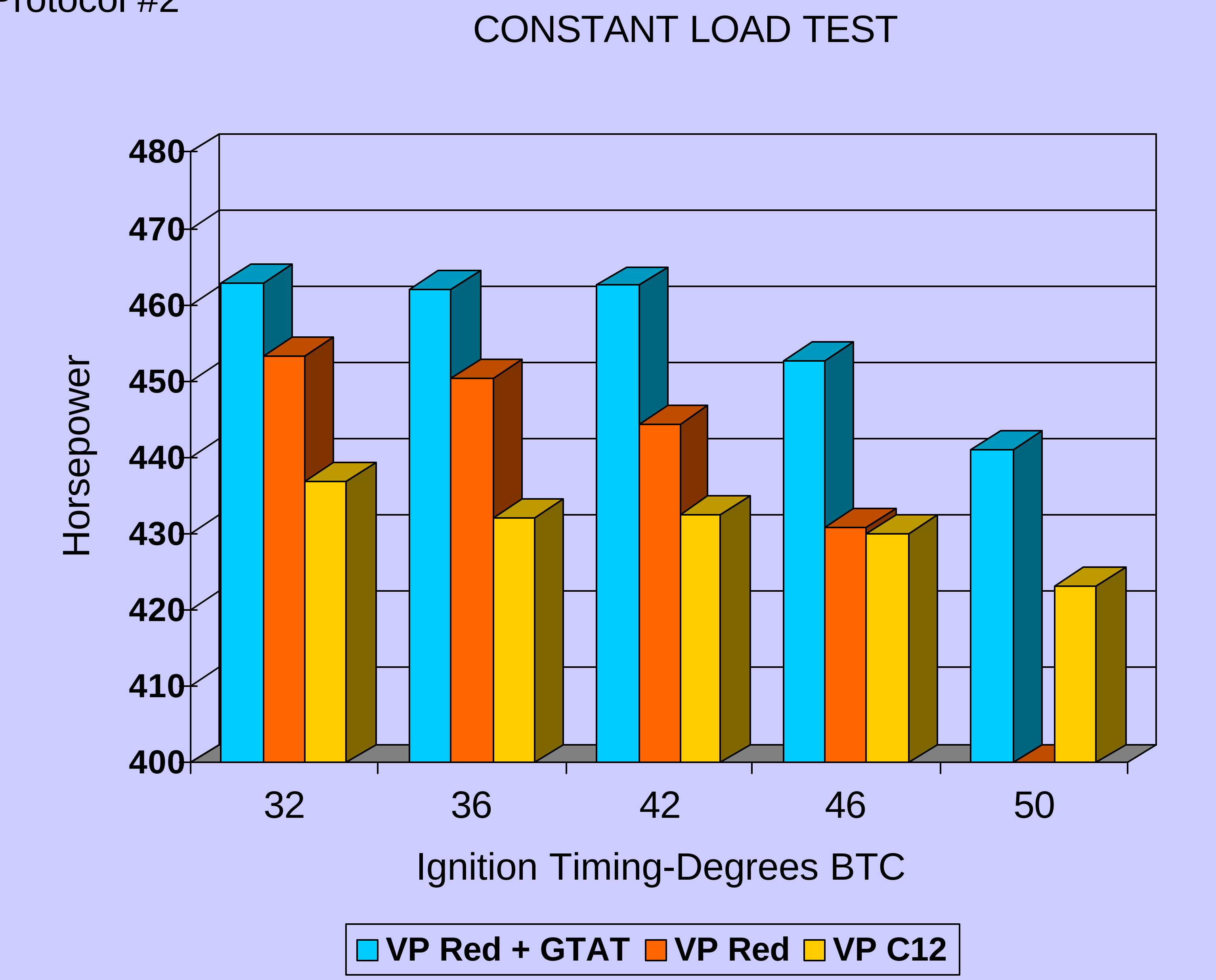
Test data is set forth in a series of graphs in the following slides.

1. In both the transient and constant load tests horsepower under load was greater for VP Red+GTAT than for untreated fuels.



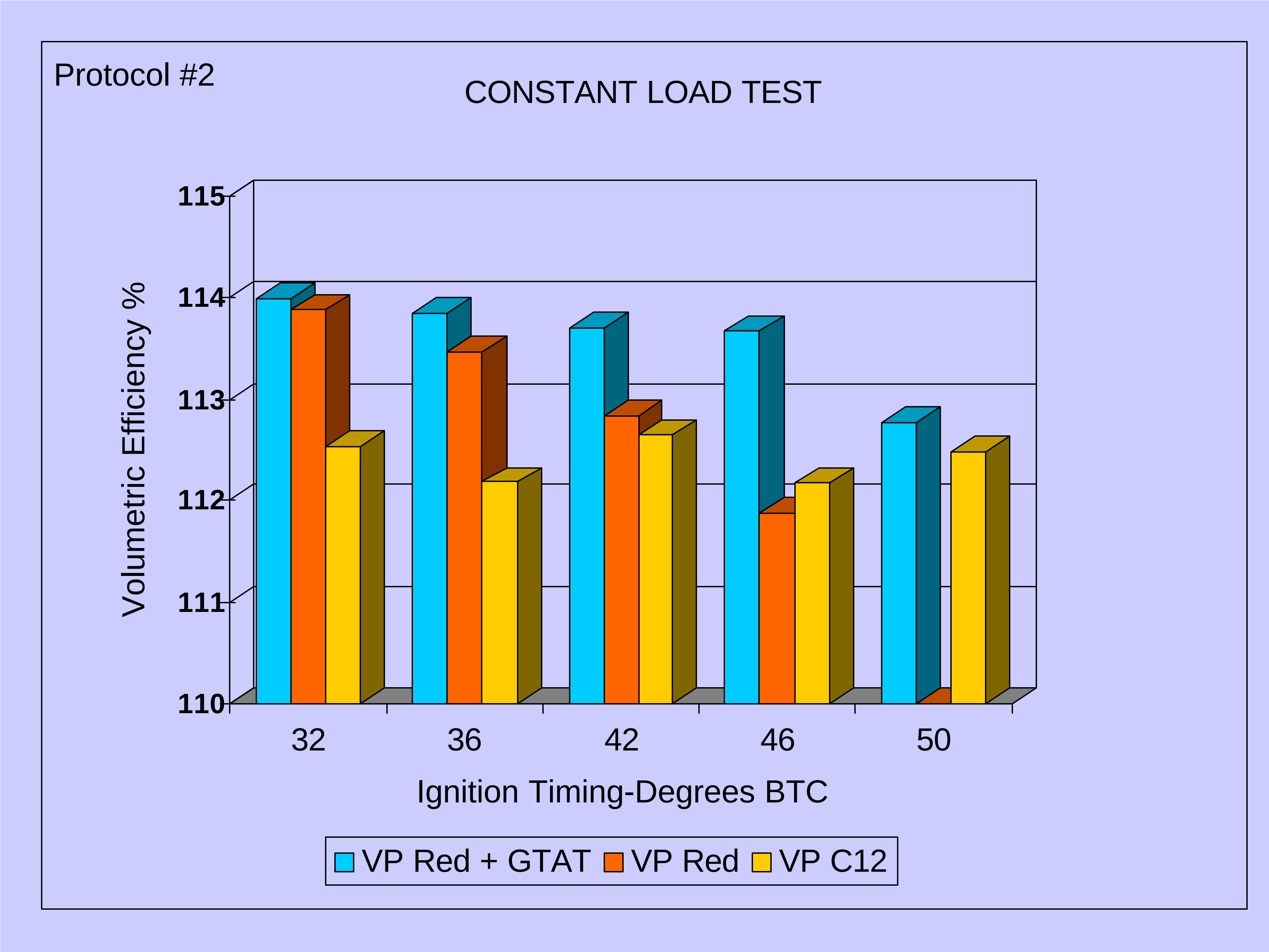
TRANSIENT LOAD TEST
Protocol #1
425
400
375
350
325
300
HORSEPOWER
100%
75%
50%
THROTTLE POSITION
VP Red + GTAT
VP Red
VP C 12

Protocol #2

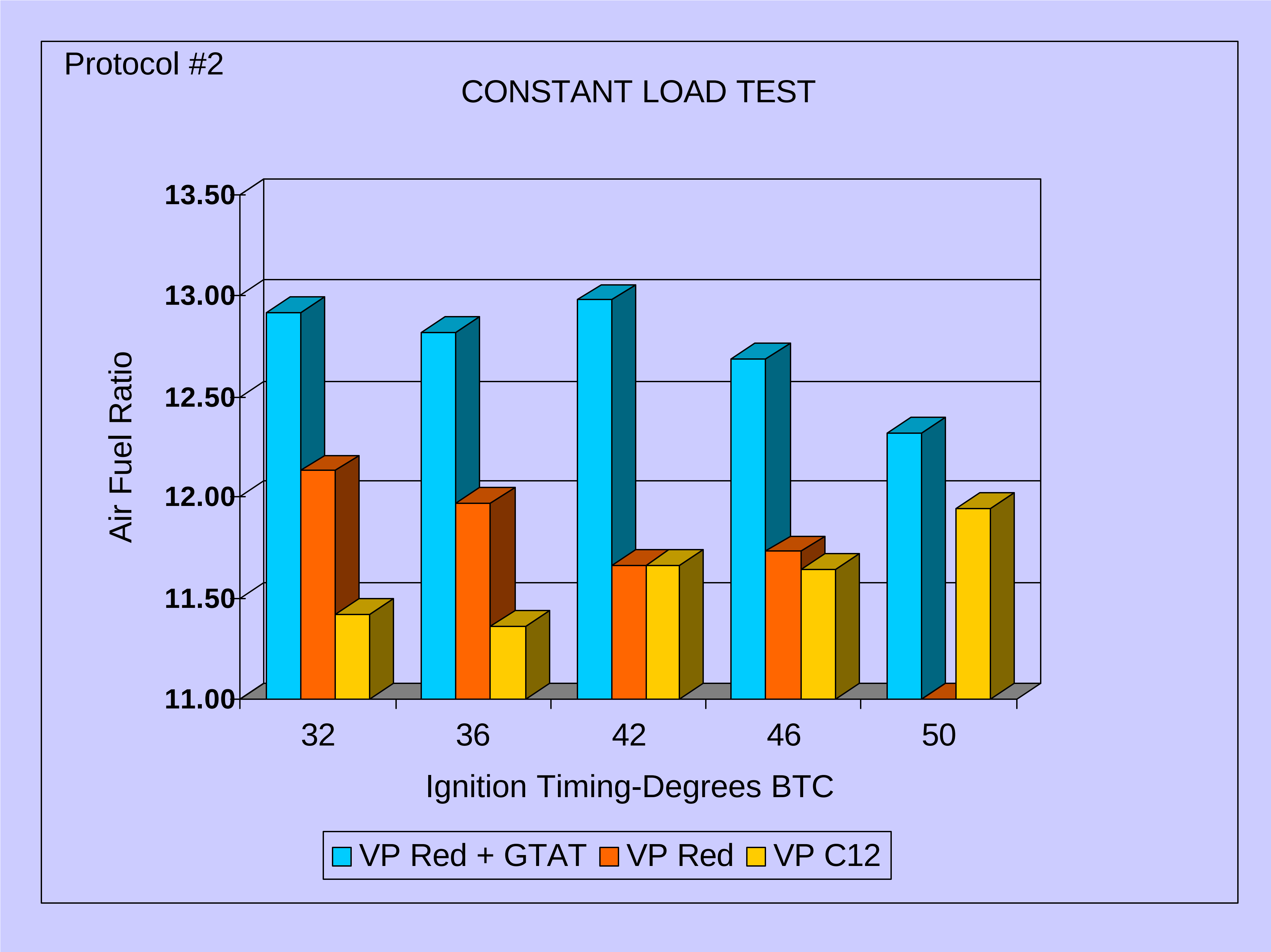


CONSTANT LOAD TEST
Horsepower
480
470
460
450
440
430
420
410
400
32
36
42
46
50
Ignition Timing-Degrees BTC
VP Red + GTAT
VP Red
VP C12

2. In the constant load test Red+GTAT had greater volumetric efficiency than the untreated fuels and the difference increased with spark advance.

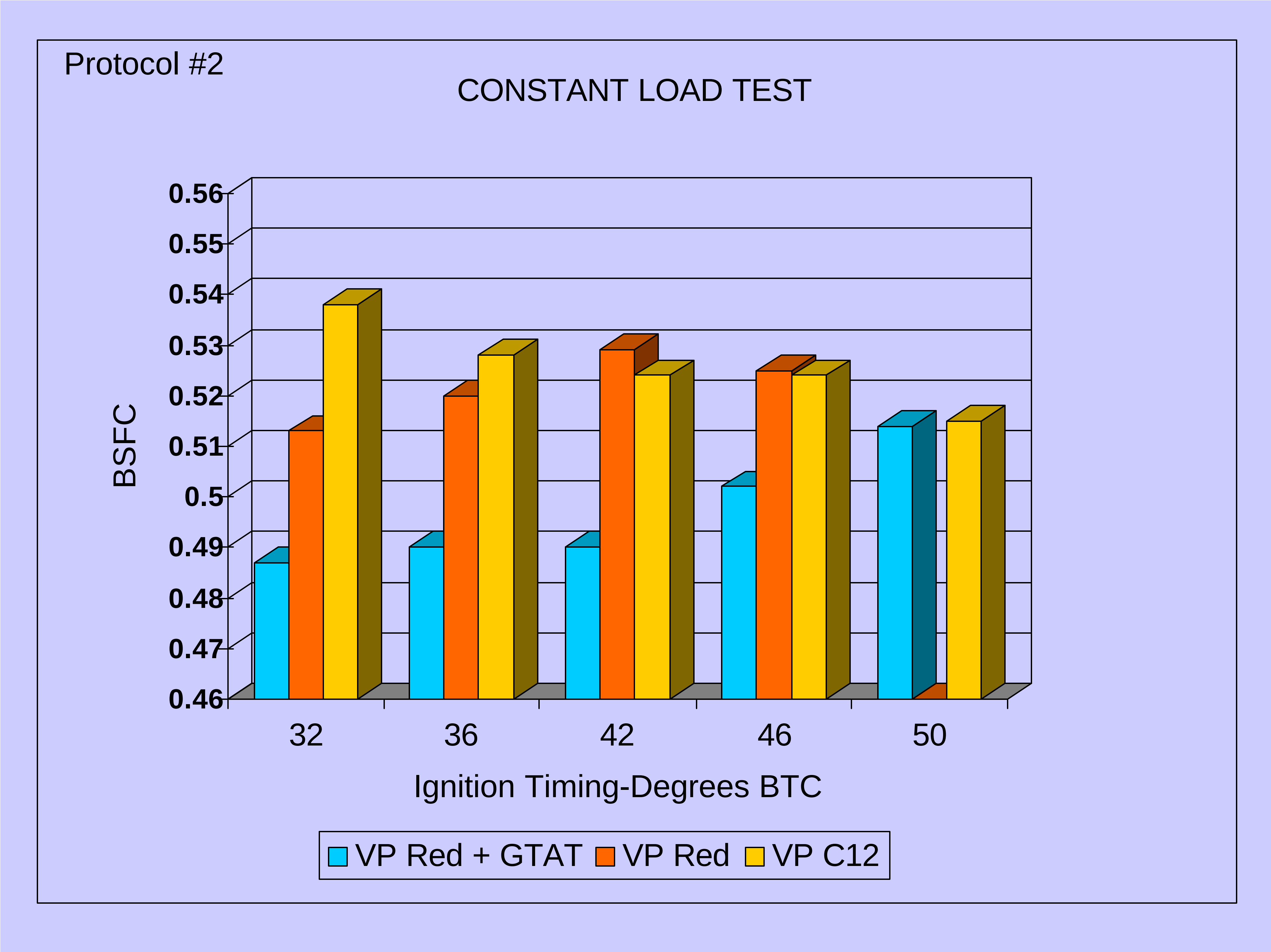

Protocol #2
CONSTANT LOAD TEST
Volumetric Efficiency %
115
114
113
112
111
110
32
36
42
46
50
Ignition Timing-Degrees BTC
VP Red + GTAT
VP Red
VP C12

3. In the constant load test the air/fuel ratio was greater for VP Red+GTAT than for untreated fuels at all ignition settings.



Protocol #2
CONSTANT LOAD TEST
Air Fuel Ratio
13.50
13.00
12.50
12.00
11.50
11.00
32
36
42
46
50
Ignition Timing-Degrees BTC
VP Red + GTAT
VP Red
VP C12

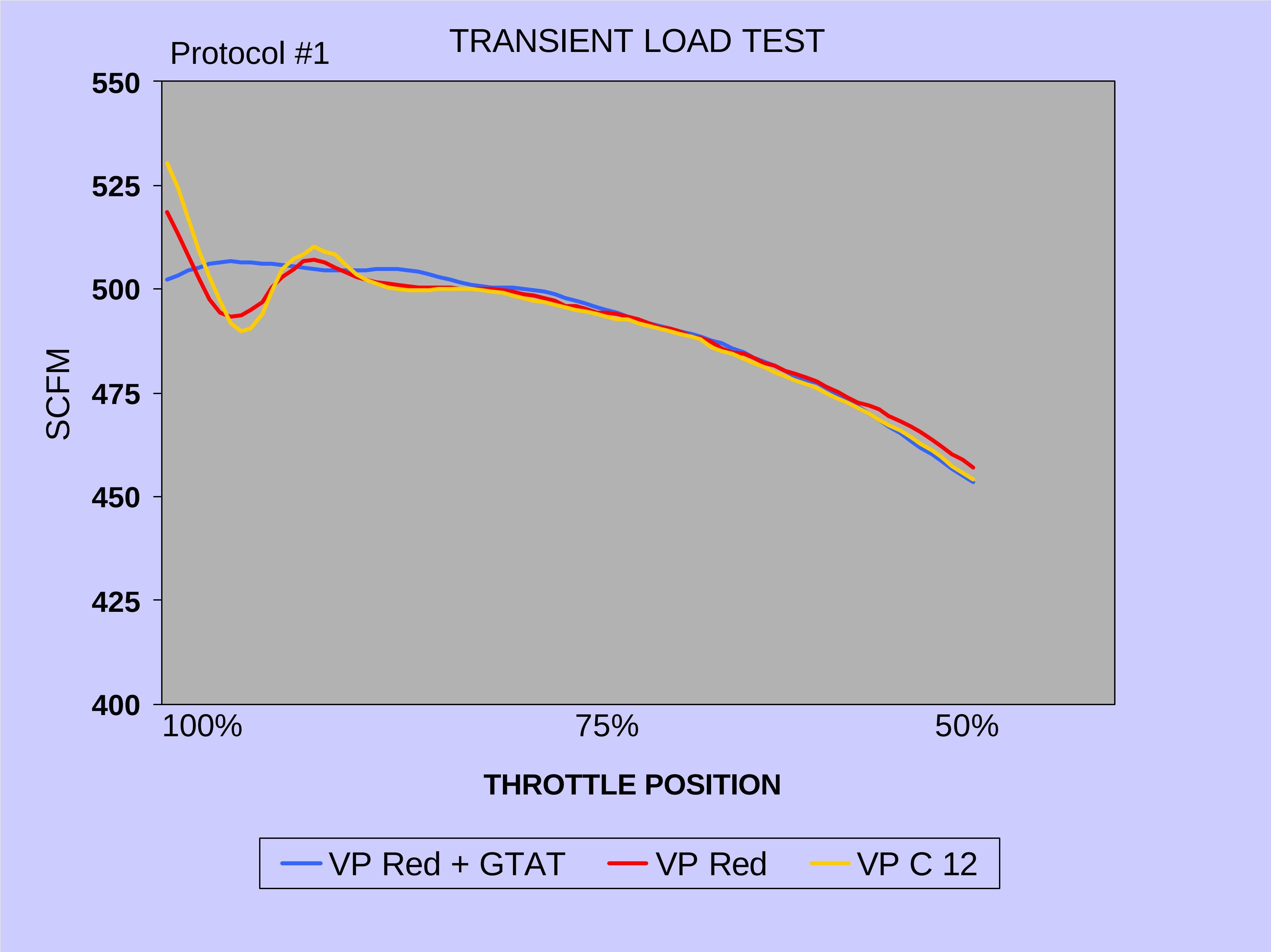
4. In the constant load test brake specific fuel consumption was lower for VP Red+GTAT than for the untreated fuels at all ignition settings.



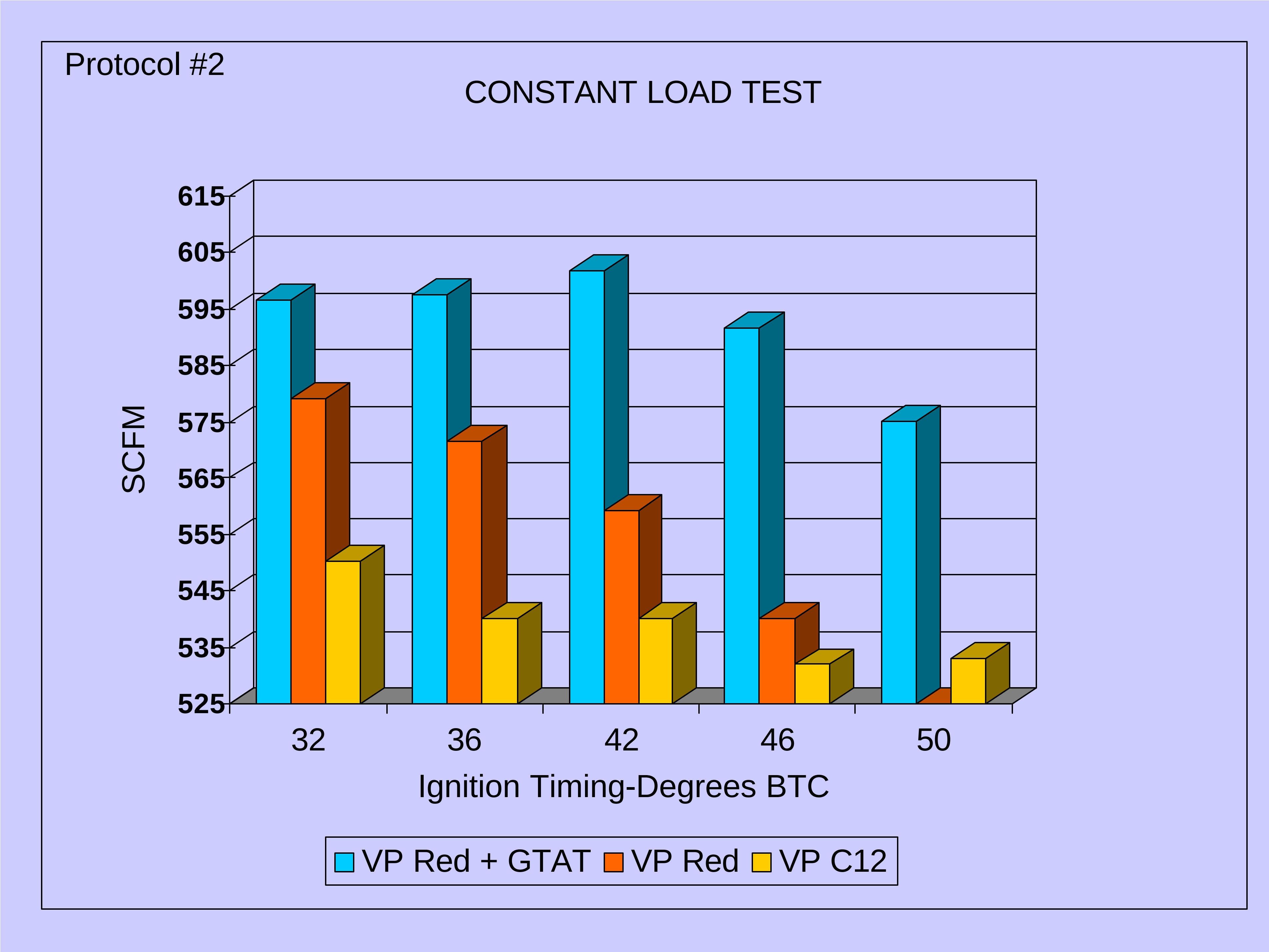
Protocol #2
CONSTANT LOAD TEST
BSFC
0.56
0.55
0.54
0.53
0.52
0.51
0.5
0.49
0.48
0.47
0.46
32
36
42
46
50
Ignition Timing-Degrees BTC
VP Red + GTAT
VP Red
VP C12

5. The engine hesitated when load was applied in the transient test using untreated VP Red and VP C-12.

6.The engine did not hesitate when load was applied in the transient test when VP Red+GTAT was used.


TRANSIENT LOAD TEST
Protocol #1
550
525
500
475
450
425
400
SCFM
100%
75%
50%
THROTTLE POSITION
VP Red + GTAT
VP Red
VP C 12

7. VP Red+GTAT had greater stability than untreated VP Red under increasing thermal and pressure stresses as ignition timing was advanced.


Protocol #2
CONSTANT LOAD TEST
SCFM
615
605
595
585
575
565
555
545
535
525
32
36
42
46
50
Ignition Timing-Degrees BTC
VP Red + GTAT
VP Red
VP C12

8. VP Red+GTAT had superior performance to the higher octane VP C-12 under all test conditions in the constant load test.

Conclusions:

1. Combustion efficiency of a high compression engine under load was significantly improved by addition of GTAT additive to high octane fuel.

2. Hesitation, or stumble, associated with transient operating conditions such as acceleration and deceleration was eliminated by addition of GTAT additive to a high octane fuel.

3. The stability of a high octane fuel under high temperatures and pressures associated with knock was significantly increased by addition of GTAT additive to the fuel.