



The *SENIOR PATTERN ASSOCIATION*

Official S I G (Special Interest Group) of AMA

Dedicated to the building, flying and competition of vintage Pattern model aircraft

SPA NEWSLETTER www.seniorpattern.com **JAN/FEB 2012**

PRECISION AEROBATICS from PATTERN'S Golden Age

SPECIAL ENGINE EDITION!!

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FAREWELL O.S. .91-FS?

Say it ain't so...now what will we do??

Let's talk about our engine options!!!!

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Join our Discussion list from within the webpage or inform any officer and we'll "sign you up". It's like a gigantic Mailing-list, but at NO CHARGE. A service to membership and potentials from SPA.

FROM THE PRESIDENT...Bruce Underwood

GUNTERVILLE, AL...SPA, "Things will be swell in 2012"

Several years ago we held a contest to come up with an annual slogan for the Association: this year the quote above was submitted by Mr. Garry Singleton of the Alabaster, AL model club. It is, indeed, "right-on" and very much obliged for Garry's slogan for this year.

With all the action (heavy coverage in the last newsletter) of the SPA in the western part of the US of A, we're experiencing "growing-pains" and they are most welcome. Our BOD is in the process of determining the 'basics' of

encompassing much more of our good country than just the Southeast. Our plans are to incorporate more of the stimulators of SPA activity in other parts of the country into our Board with a National objective rather than simply South and Southeast venues. Part of this has been in the "infancy" stage for the past couple of years with Jeff Owens joining our leadership as Vice President from Florida and Eric Nessler becoming a director in the state of Ohio. We are getting lots of good input from the pilots and promoters of the western events featured in the last edition of the newsletter and my suggestion is that you "stay tuned".

Duane has done a great job of assembling this "engine" edition of the newsletter with some interesting engine info and some "editorials" from diverse folks from of our sport/hobby. He declares the January/February edition, (absent massive contest input), allows him more space for basic model building/flying items, and other "fun stuff".

Thanks much for your prompt submission of your meager \$20.00 annual dues and/or your Lifetime membership application. Mike does a splendid job of locating "bargains" for our SPA investments. We hope to have a projector for projecting some training DVD's on the sides of motor homes, club movie screens, etc. More on this in the future.

Hope you made your' new year resolutions to include more SPA contest activity this year and enjoy, in person, that good fellowship you read about each two months here .



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Editorial—SPECIAL ENGINE EDITION....by Duane Wilson
Will the loss of the O.S. .91 FS lead to a crisis, or an opportunity ??

The Jan/Feb issue of the newsletter is a "fun" issue, and a chance for us to talk about other topics besides the contest coverage that dominates the pages during the competition season. This edition has been dubbed the "Special Engine Edition" because it will focus on the new challenge we face now that the "old reliable" O.S. .91-FS is no longer readily available from your favorite supplier. First, my heartfelt thanks go to several article contributors including two articles from noted "engine guru" Bill Collins, plus contributions from Eric Nessler and Arizona's Gary Polinski. They will share their impressions as we look at other engine alternatives to the O.S. **BTW—I'm always looking for articles to share with your fellow SPA pilots, so don't be shy about contacting me about future article contributions for the NL—we'll work together.**

Now if you are an "electric guy", (lucky you), you can chuckle to yourself and shake your head as you read, or skip right to the article by Jeff Owens, then go to the "COOL INTERNET LINKS"—aircraft-related internet links found in the ELECTRONIC version of the NL on the web site. This is the best collection yet, and it's a good reason to read the newsletter "on-line".

Now back to engines—when I joined SPA in 2005, the O.S. .91 FS was already the engine of choice for most of the experienced pilots, and Bruce Underwood "wannabees" in the lower classes; things haven't changed much since then. It has been generally understood the O.S. sets the performance standard for the best combination of power, reliability, and ease of use. As competitors, most of us "want the best" so we can rest assured the engine, (at least), isn't the "weak link" in our performance.

Up to now we have had reliable sources to purchase brand new engines if we chose to. I've been told that (at least) some of us buy a new O.S. engine each season to keep the risk of engine problems, (i.e. poor performance and the dreaded in-flight "flame-out"), to a minimum during a contest. A new engine every season should do that, and the price, (while not cheap), was well worth it for peace of mind--now that option's gone. The O.S. 91 will soon be history-- and sooner than we might realize.

Some are saying, "there are plenty of O.S. .91FS engines and parts out there on eBay and elsewhere." Well maybe yes and maybe no. The good ones won't last for long. Already, NIB O.S. .91 FS engines are getting scarce and are snapped up — and used, low time engines will soon be at a premium. Will we have the "haves" and the "have-nots" when it comes to the O.S. .91? I have already heard people speak of shortages of certain parts this past season. Will the more fortunate of us, (at least for awhile), continue with the preferred O.S. depending on 1) how many engines and how large a parts inventory we have, 2) our ability (or lack of it), to scavenge parts and work on engines, or 3) our network of friends with the necessary engines, parts, and know-how, while the rest of us are forced to "settle" for something else? That looks like a distinct possibility. In a political season characterized by so-called "class envy", will there be spoken or unspoken murmurings of "O.S. .91 envy"—who knows?

O.S. has replaced the .91 with the .95 (at the same price charged for the .91), but since the rules limit size to a .91FS, that engine will not qualify, **and there seems to be no mood within SPA to allow it at this time.** For that reason, only legal engine alternatives will be discussed in this issue.

There are other brands of .91FS available by Saito, Magnum, ASP, and Thunder Tiger, but so far they are generally considered not to be up to the O.S. standard performance-wise, (otherwise everyone would be using them). Is that long-standing perception still true?—take a look at the reviews to follow and make your own decision.

Let me anticipate the most obvious response from those who might downplay the whole engine issue— of course I realize the reliable O.S. .91FSII engine is only a part of the overall competitive edge, and flying skill and practice, (i.e. burning fuel), will always trump equipment, but still, **one of the principles SPA has been built upon is the ability of all pilots to have exactly the same equipment, (no technological advantage). Will that no longer be the case?**

With the available options, what will folks do? 1) Will this be the deciding factor that persuades more of us to convert to electric power in order to avoid the whole engine issue? 2) Will another brand of engine be found that's just as good, (or so close), that this "engine problem", for all practical purposes turns out to be a non-issue? 3) Will SPA eventually decide to increase the engine size slightly from .91 to .95, making the replacement O.S. .95 available, or 4) will we find that the new, (and more expensive) O.S. 81 FS, (see critique in this issue), has all the power needed so that everyone voluntarily settles on that smaller engine? Only time will tell, but at least we can start the discussion. I'd appreciate feedback regarding what YOU think and are going to do about the "engine issue." What are your ideas? I'll post some of the best replies in the next edition.

Remember to build close to planform...and all the best for 2012. Tell us what projects you have underway for next season.



From the Vice-President.....Jeff Owens

Tallahassee, FL – By the time you read this in the newsletter, the New Year will likely have arrived. During this time of the year we have the opportunity to reflect on the past contest season and to make plans for the next one. This year we saw a big shift in the populations of the various classes. Gone were the days of Novice having the majority of the entries - Sportsman ruled the roost at most of the contests. And the competition at the Expert level was intense – I’m still recovering from the “lessons” I received at the hands of some very able pilots! All of this growth at the upper levels is a very good thing and it speaks to the growing experience and expertise of the membership of the SPA.

Bruce has mentioned the growth of the western segment of our membership. This is a very gratifying development as it speaks to the durability and viability of the concepts put forth by founder Mickey Walker some twenty years ago. And the 20th anniversary contest in Atlanta this past year was a wondrous celebration – I only wish that I could have been there to join in, but research duties intervened.

Looking ahead to the new contest season, I am sure that many of you are honing your skills and developing new weapons of mass point accumulation (WMPA). I have some new developments underway at my skunk works (with apologies to Lockheed’s Kelly Johnson) and I’m looking forward to some new testing, trimming, and fine-tuning of my own WMPA.

Happy New Year to all of you and may your maneuvers all be 10s!—Jeff



Commentary From the Engine Room—By.....Bill Collins In 1991 when Mickey Walker founded SPA,

he had a vision about a Competition Circuit that the average guy or gal (i.e. person), could afford and have fun without mortgaging the farm. SPA has served its purpose and continues to do so, but, like everything in life, time changes things, and we must change to keep up with our changing world or we will be left holding “The Bag”.

Most people don’t like change and I admit I am one of those people. But, I have been in business 47 years and we do not do business at all today like we did in 1964. When I started Collins Auto Parts, my son Bill Jr. spent 2 years trying to convince me we needed computers. Crazy kids! Today I can’t imagine or think about doing business without computers.

In the last few years we have spent a lot of time discussing what air frame meets the original design concept that Mickey approved. I have 3 Daddy Rabbits and 2 have plug in wings. All three have many “mods” that were not in the original design. But they fly well and make a bad pilot like myself look better. All of the mods have been made over the years to make the Rabbit a favorite of many pilots.

The **OS 91 Engine that we have come to love, (those of us of the 4 stroke family—which is most of us), is no more.** The OS 91 silver head, the OS Surpass II, the Surpass II pump—have all been discontinued by OS; parts will become hard to get, and the price, (if available), will become a premium.

Remember-Supply side economics. OS has 2 new engines on the market that I think we need to look at. The OS 81 is a great engine—looks good, and has good horse power output, almost as good as the old 91 we love but, a little pricy at \$369.95. The other is the new OS 95. It’s not quite in the same class as the .81 but a lot better price right now at (only) \$299.95. The .95 size does not fit the original criteria Mickey had in mind however, *but neither do a lot of the planes we fly today.* I know there are a lot of other engines out there. The Saito, (which is a good engine), just does not have the power of the OS 91. The Magnum and the Thunder Tiger are clones of the OS 91. They also do not have either the power or the quality of the OS. Another thing to Consider, since they *are clones*, (of the OS which is no longer made), I suspect we will see them follow suit and *become clones of the new OS 95.* Then what do we do?

I do not want to sound an alarm, but, (like Bob Dylan says), the “...times they are a changing” and I do not think our Board of Directors, (you know the “Master Minds”), should wait until there is an acute shortage of the popular OS91, OS91 II, and OS91 pump in order to make a decision.

“COOL” INTERNET SITES We have a great group of internet links this issue. The internet links feature is another reason

to go to the web site and read the electronic newsletter, (under “Downloads”). Besides the fact the print is larger and the pictures and colors are brighter, by clicking on the link, the newsletter becomes interactive as you are taken to all these aviation-related websites, some having to do with R/C, and others general aviation. This adds quite a bit to the enjoyment of the newsletter itself. Special thanks for leads go to Jay Marshall, Eric Nessler, and Vic Koenig.

Turn up the sound, and open to FULL SCREEN. ENJOY!!

Dwayne O’Brien “We Remember” (Keep Them Flying)<http://youtu.be/RU1oB8sGyYM>

Like Flying (8 minutes of bliss).....<http://www.sleepingdogtv.com/>

Everything You Ever.....About Breaking the Sound Barrier ..<http://www.wimp.com/supersonicflight/>

US First Jet.<http://www.aircraftowner.com/videos/view/americas-first-jet-flight-october-1942-1617.html>

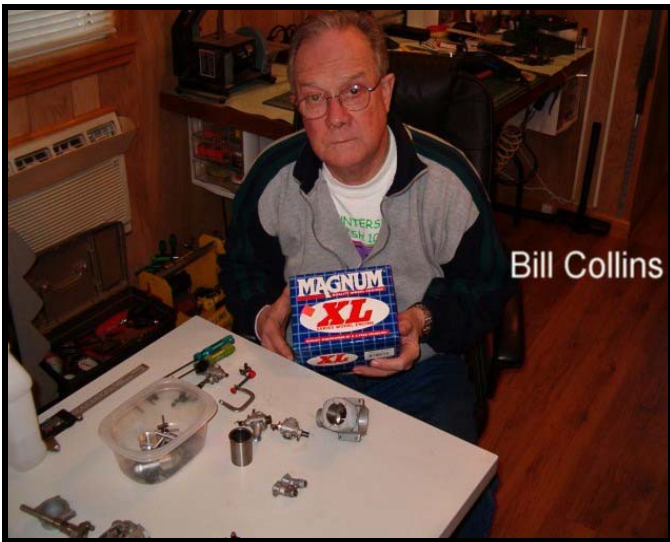
YAK130 “Rusjet” (Man What a Detailed Model!!!.....http://www.youtube.com/watch?v=glsvW_yhhjs

Nieuport 28 (Talk About a Take-Home Project).....<http://www.youtube.com/watch?v=xaotIR0nMW4>

USS John C Stennis Our newest Carrier... Aviation buffs, it's a five star presentation[CLICK HERE](#)

Discovery Channel, Death of the Red Baron (3 PARTS, SEE BOTTOM)..... <http://www.youtube.com/>

[watch?v=USDZRARjkIU&feature=results_video&playnext=1&list=PLD736F5D6BF3D791F](http://www.youtube.com/watch?v=USDZRARjkIU&feature=results_video&playnext=1&list=PLD736F5D6BF3D791F)



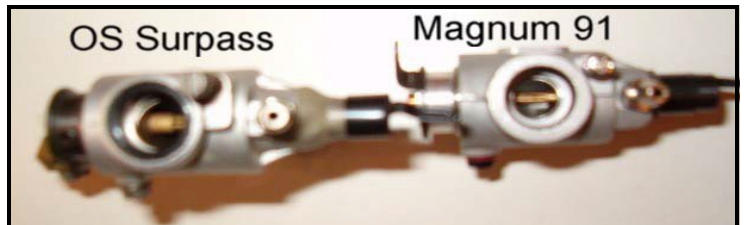
Bill Collins

O S .91 SURPASS vs. MAGNUM .91 LET'S DO SOME COMPARING

.....Bill Collins/Bruce Underwood

The article below originally appeared in the March/April 2007 edition of the NL. It was the 1st head-to-head internal comparison of the Magnum .91 to the tried and true O.S. .91. (edited from the original). Then look on page 5 for SPA Expert pilot Eric Nessler's 2011-season "field trial" of the Asian version of the Magnum—the "ASP". Have things changed since 2007?

"ENGINE GURU" Bill Collins, at my request bought a MAGNUM .91 4S, dissected it for comparison with the OS .91 with which he is most experienced. I followed his "experiments" with camera & pad.



Barrel to intake OS = .346 (8.84MM) MAGNUM .278 (7.05 MM)(Collins) "Physical size allows more air which allows more fuel= more power or thrust".

Cylinder liner: No appreciable difference nor concern. Piston & Rod assembly comparable. On test engine (MAGNUM) one of the wrist pin keepers was not installed at China factory. Cam drive & followers same. Bearings in OS, camshaft and rear are shielded, MAGNUM is not. Quality of bearings unknown.



MAGNUM vs. OS. HEADS



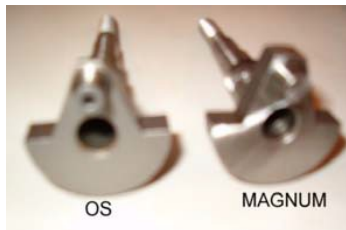
Case quality inferior in MAGNUM. The MAGNUM crankcase has a groove machined assuming wear of crankpin allowing while "wallowing" of conrod on crankshaft counterbalance.

LEFT.: MAGNUM arms machines of aluminum. O.S. are stamped. "I prefer the MAGNUM arms..."

Above Far Right, HEADS Head bolt hole drilled into cavity in left pix. Much deeper fins of OS will cool much better. Plug offset to favor exhaust valve means hotter head temps. OS

cools much better. (Larger)

Right: Machining of Combustion Chamber not uniform on MAGNUM. Additional machine



quality of OS allows better breathing. Cooler = more H.P.

Note cooling hole in OS crankpin dissipates heat, None in MAGNUM. OS crankpin is machined and MAGNUM is swedged. Under extreme temps, swedged pin could come loose. "Heat buildup at this point is very critical"

Manifold: Diameter OS .337 MAGNUM .298. "OS will breathe better". "Very little difference on exhaust manifold: Muffler is baffle free and preferred like old style 91 OS".



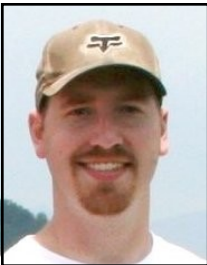
SUMMARY: "For a beginner, Novice or Sportsman, MAGNUM is definitely a good buy. If in Expert where maximum power and Horsepower is necessary, the OS might have an edge unless newer Magnums have been changed. If you choose MAGNUM, be aware of possible heat generation. Follow the break-in procedure....never allow a LEAN run". "If you produce power, you gotta produce heat and you gotta get rid of it!" Both engines mount the same, this is convenient. (ED NOTE:)Randy Roberts boasted 9500 RPM on his MAGNUM with 15% Cool Power and 13.5 X 9 APC. Said "Idled smoothly". When he FLEW the 7 lb or less INTRUDER he used a 13 x 8 prop. Jamie Strong has a new MAGNUM and says it is about 500 RPM under the OS FUEL AND PROP comparisons.

ASP .91-THE "TWO FOR ONE" ENGINE

CAN YOU AFFORD A NEW ENGINE EACH SEASON??

SPA EXPERT WINNER ERIC NESSLER SHARES HIS INSIGHTS ON THE "ASP" HE USED DURING THE 2011 CONTEST SEASON

After reading Bill's internal comparison of the OS and Magnum, the question arises, "OK we've seen the "static" review and see the possible negatives--how does the Magnum/ASP actually perform under contest conditions?" Well, anyone who spent much time with Eric Nessler last season knows he and John loved the performance of their ASP(s). This causes me to ask the following practical questions: 1) Over the past 4 years, has Magnum/ASP perhaps improved their quality control to improve the newer engines, or 2) Do the identified negatives actually translate into less performance, (at least over the short term)? It's hard to know if the Magnum/ASP will hold up over time the same way our sturdy OS has, but at the ASP price, perhaps a new engine every season (or every other season), could be a reality—with the "old" one held in reserve as a spare. A new (unworn) Magnum/ASP up front might make up for the inevitable wear failures we experience with the OS as we run them over several seasons, (at the OS price most of us have to). Time will tell, but Eric's report is encouraging because (like it or not), the OS .91 is gone, eBay isn't forever, and critical parts will get scarce before we know it.—Duane



I have been asked to write a little about the ASP.91 engine I used in competition for the 2011 season. Anyone who came into contact with me on the contest trail this season knows that I really like the ASP as I've bent ears from one end of the Southeast to the other singing the praises of this "budget wonder".

First off, let's identify the ASP for what it is; it is mechanically identical to the Magnum .91. It is my understanding that the engines are made in the same factory by the same workers, the only thing that differs is the crankcase identifying ASP or Magnum. The engines bound for the European and Asian markets are called "ASP"—those bound for The United States are dubbed "Magnum". Parts are available under the Magnum moniker here in the States from [Hobby People \(www.hobbypeople.net\)](http://www.hobbypeople.net), and are priced very reasonably. Well then, why choose the ASP over the Magnum? Cost was the primary reason for me. While you can occasionally catch the Magnum on sale at a great price, the ASP is always on sale. Competing in SPA and living in Ohio tends to make for a pretty expensive summer, so any way I can trim the budget while not sacrificing performance is a good thing for me. I purchased my ASP .91 from Hobby King (www.hobbyking.com) in Hong Kong. It sells for \$129.95 on their site, and with shipping it arrived at my door in Dublin, Ohio for \$149.95 total.

From the very start the ASP has been very easy to tune. The engine was broken in while installed on the airplane, as I was pressed for time this spring while trimming my new Daddy Rabbit before the first contest. Using an APC 13x8 Propeller, we ran 2 tanks of Omega 10% through the engine initially on the ground. For the third tank, we switched to Cool Power 30% and flew the airplane. The first 10 tanks were run on the rich side, very gradually leaning from flight to flight. By the 10th tank, the engine would hold a leaner setting and I recorded a steady rpm of 10,600rpm, (as evidenced by the attached picture). This was recorded with a Tower Hobbies brand digital tach. The engine now has since logged around 150 flights, and while I never did tach it again, I believe it has gotten a bit stronger along the way. It has proven to be a very reliable engine, rarely needing a needle adjustment once out of the break-in period.

I liked the ASP so much and have been so impressed with this engine that I bought another. If that doesn't tell you what I think of the ASP, nothing will. Is the ASP/Magnum capable of performing up to the task of top level competition? Several fliers over the last handful of years have proven it not only capable of competing, but winning at the upper levels of SPA."

No matter what engine you choose to run next season, please be safe. I look forward to seeing you on the contest trail in 2012.

.....Eric Nessler



THUNDER TIGER .91 FS Impressions by Gary Polinski ...SPA 381



When I was seeing the interest in looking for a new replacement power plant for the OS, I decided to step up and order one from Tower Hobbies. This all started during early October. After receiving the engine and removing it from the box. I found all the tools needed to work on the Engine including a set of go/no go gauges (feeler) to set up the valve lash. Also included was a Redline Glow Plug. I found that Thunder Tiger (TT) was using a waist oil nipple but not in the bottom of the crank case, but instead in the rear of the engine back plate. I removed my OS .91 to see how it would fit in my KING ALTAIR. I found that the front bearing and webbing was larger on the TT than the OS. I had to do some small modifications to drop it in to the mount. Once that was done it was a perfect fit

for the existing OS mounting holes. The TT has the "v" type valve design like the new OS .95. The muffler and pipe are interchangeable: I did that to see if there was a sound or performance difference. When I compared the TT to my OS (same fuel and prop), the difference was so small I can see the TT being an excellent replacement option for the OS. I set the Engine up on my test stand to break it in, I was running 15% Power Master fuel and followed the procedure to the letter as per the manual. My first propeller was an APC 13x9 and after the first 5 tanks of fuel, I started to take some RPM readings. With an APC 13x9, it was holding full throttle RPM of 9,600, Then with the 13x8 APC it was holding 10,110 RPM. The carburetor is changeable like the OS, and I needed to do that so my throttle was on the correct side.

The only problem I encountered were propeller throwing issues. I've found that the OS outer lock nut is taper-drilled to match the opposite taper of the prop nut. When I swapped the OS nut on to the TT that problem was solved. When I contacted TT about my findings, they said I was locking the two nuts wrong, (not in those exact words—now one would think I would know how to do that after 30 years of being a Master Certified Technician).

Being concerned about parts, and looked up TT parts on the Tower Hobbies web site. I found there is a house-full of parts support there for this engine. As of this writing I have not had the TT in an Airplane sad to say, (but I am going to order a new 60 sized Great Planes "Big Stick" to test it on....More to come!! ..Gary



OS .81 FS-a vs. FS .91SII

Our long-time accepted standard OS .91 is gone. Let's take a hard look at another OS 4-stroke already gaining a favorable reputation by those in the know.

Can the "Cadillac" FS-a .81 be the engine that becomes the new standard?

...Engine evaluation and "blueprinting" tips by Bill Collins & "assistant" Bruce Underwood.

In my previous article we talked about the end of the OS91 engine as we know it today. Yes, I am aware of other engines of the 4 stroke variety out there, but those I have tested can't perform with the OS 91. There were three 91 engines—the original Surpass or silver-head, as it's

known, the FS .91SII, and the FS .91SIIP (pump). Only the **carburetor** is different in the latter two.

In 1991 I started flying RC, my first a 45 Magnum 2 stroke engine. I later purchased my first 4 stroke, a .91 Magnum. Later I bought a Surpass .91 silver head which, (having spent many



years in NASCAR & NHRA as driver and engine builder), I fell in love with. I immediately disassembled it to see if the "japs" had overlooked some HP on the inside. What I found was a very good engine, but a lot of little things needing to be cleaned up. I started experimenting,...some experiments were successful, some not. In about 2004 – 2005, I added a velocity stack on the carb and after 25 to 30 various lengths settled on 11/16 to 3/4" length (stack) as Ideal.

Thus, was born the Bill Collins Ram Air engine. In 2006-7 we were in Atlanta & Cass Underwood flew a Daddy Rabbit with a standard silverhead that I had built for him with the velocity stack. Those of you who knew Cass knew he was always in a hurry. When he fueled up once, I accidentally left off the pressure line to the muffler. Cass took off and someone noticed and said "your pressure line is loose". Cass said, "it doesn't matter we don't need it". He had more confidence than I did. He won the round and I knew we were on to something. All that is in the past and we must move on. The OS 81 is the only OS engine currently meeting the rules and specs. Both the OS 81 and 91SII are of the over Square design. The bore is larger than the stroke. Both produce max HP at 11,000 RPM (See specs). **CONTINUED—>**



**Above—.81 left and .91 right
RT: Unique oil return design,
(note white arrow) eliminates
need for crankcase ventilation.**

CONTINUED The 81 has a factory installed velocity stack (guess what) it is approximately 3/4" long. No, the Japs didn't copy my design which took 2 years experimenting, they probably did it in a couple of days on the dynamometer. The new 81 and the old 91 II carbs are similar and the stack will fit both. The part number is 44881300, called an "air funnel". Price is \$13.95 which is far less than I can make them for. The 81 is much better designed with quality machine work, approximately 1.5 to 2 oz lighter. The muffler is a neat design but I use the OS 70 Muffler, part # 45625010. Drill out the exit to .332 inches. This baby comes-to-life, and because of the internal crankcase vent system it leaves no messy residue on your model.

The cylinder head on the OS 81 and 91 are close in design and specs, but the designers did a great job on the intake port of the 81. The intake manifold and head passage match closely. The old 91 lost much HP in the fit. A 4 stroke loves to breathe. If you have the time, patience, and tools you can blue print any four-stroke.

Why should someone pay extra money for a smaller displacement .81 size engine when the ASP and Magnums .91s are probably more powerful for less money? Yes it's well-built, but an .81 is still just an .81--right?? Wouldn't ANY .91 be more powerful than even the best .81? What's the advantage of using it? Would YOU use an .81 over a .91... why?

Bill and I agree, "more cubic inches equal more power"! but take a close look at the detailed photos with particular attention to the uniform and polished intake and exhaust areas. The extra dollars for this .81 reward the owner with quality like this, plus the "blow-by" crankcase oil is brilliantly returned to the valve rocker-arm area via that little hole you'll note in the head photo (see the white <) pointing to it adjacent to the intake valve. A photo is not enclosed of the crankshaft provided with the .81. If it had been it would have revealed that perfectly polished hardened crank with a drain hole located just behind the bearing that allows the return of the precious "blow-by" oil up through the pushrod covers and into it's "double-duty" as continued lubrication for arms, etc. This, negates the need of external tubes that are subject to rubbing against throttle linkages, etc and leading to engine failure, most times, at the height of competition. The model stays clean and free of fuel residue!

Bill's (and my) contention is this brilliant, exacting addition to the .81 and the addition of the velocity stack and precise sizing of the ports are well worth the extra price. It could be compared to the choice an auto buyer makes; "a Chevy will get you there", but, if you desire quality and extra innovations, you pay more for a Cadillac. It's the passion for the "quality" of the .81 which allows it to equal a "stock" .91 in BHP and performance based on our experiments.

FS 81 4S

Disp. 13.26 CC or .809 Cu. In
Bore 27.7 – 1.09 in
Stroke 22.0 – 0.866 in
Prac RPM 2200 – 12,000
Power Out 1.3BHP @ 11,000
Weight 556 Gr – 19.63 Oz
Muffler 54 Gr – 1.9 Oz
TOTAL 610 Gr – 21.53 Oz.

FS 91 S II

Disp 14.95 CC – 0.91.2 Cu In
Bore 27.7 – 1.09
Stroke 24.8 mm – 0.976 in
Prac RPM 2,000 – 12,000
Power Out 1.6 BHP @ 11,000
Weight 640 Gr – 22.6 Oz



Here are shots of an experimental muffler (Modified) alongside the stock 70 muffler. The outlet is almost double that of the stock. Just another way of relieving impedance, so the engine heats less and handles a larger volume of air. This is to balance the volume of air induced at the intake, a result of the velocity stack.

Proposed Dates for 2012 (ALMOST) OFFICIAL

April 21-22	Cullman, Alabama—	Steve Byrum, CD
April 28th	Fort Worth, Texas	Ken Knotts, CD
May 19-20	Tulsa, OK	Lindy Quinten, CD
May 19-20	Knoxville, TN	Dennis Hunt, CD
June 16th	Texas Wings	
June 23-24	Cass Underwood Memorial (Mac Hodges)	Dan Dougherty, CD
July 21-22	Asheville, NC. (Pat Hagan Memorial)	Will Hicks, CD
August 25-26	Chattanooga, Tn. (SPA Classic Pattern)	Mike Robinson, CD
September 15-16	Ft. Worth, TX - (SPA-West Open)	Ken Knotts, CD
September 15-16	Prattville, AL	Jamie Strong, CD
October 20-21	Atlanta, GA (SPA Southeast Masters)	John Baxter CD

SENIOR PATTERN ASSOCIATION MEMBERSHIP APPLICATION

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Name _____

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Date of Birth: ____ — ____ — ____ AMA Number _____

Telephone (____) _____ E-Mail _____

Mail this form along with check/money order made out to The Senior Pattern Association for \$20.00 to: Mike Robinson, 2006 West Brookhaven Circle, Dalton, Ga 30720

Mike Robinson
2006 Brookhaven Circle
Dalton, Ga. 30720

