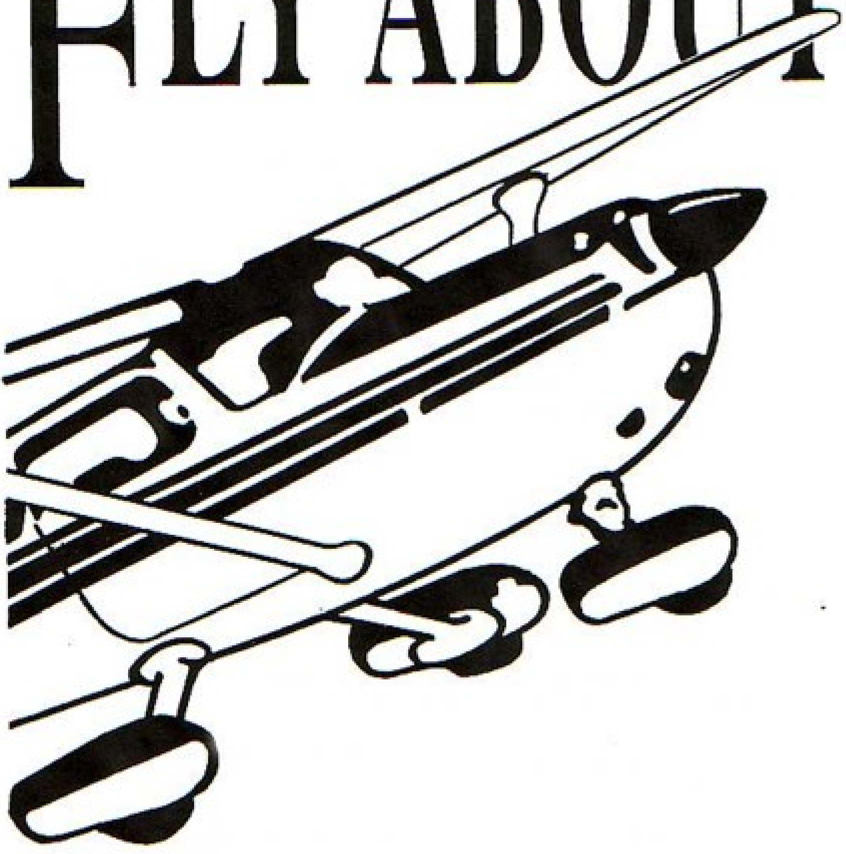
FLY ABOUT



OFFICIAL ORGAN OF THE NORTHAM AERO CLUB (INC)

POST OFFICE BOX 247 NORTHAM WA 6401

PRINT POST 100018823

Volume 48 Issue No. 5 May 2017

PRESIDENT	Errol Croft dowref@bigpond.net.au	0428 880 149
VICE PRESIDENT AIRCRAFT BOOKINGS BAR MANAGER	Matt Bignell big.matty@hotmail.com	0407 873 700 08 9622 3001
TREASURER	Lila Tame nactreasurer@westnet.com.au	
SECRETARY	Heather Deegan secretary@northamaeroclub.com	0428 738 808
CLUB CAPTAIN HOUSE & GROUNDS	Peter Hill prh@aurora.net.au	0450 415 947
AIRCRAFT FLIGHT TRAINING	Dave Beech dbeech@iinet.net.au	0416 242 846
FLY ABOUT EDITOR	**M Jacobson - martinj1@iinet.net.au**	0438 437 928
WEBSITE	**www.northamaeroclub.com**	
EMAIL	**secretary@northamaeroclub.com**	
CLUB ROOM	**Withers Street, Northam, WA**	08 9622 3248

PRESIDENTS REPORT

Hi to all our Mothers, I hope you all had a Happy Mother's Day.
All of you who still have their Mothers are so lucky. My Mother is 90 years of age and has mothered 7 children and Heather's Mum is 93 and has brought up six children. When we look back on their life, haven't they done it hard at times, but they are still so happy to see their children.

Welcome to all our new members. Welcome also to our new Instructor Murray Bow who is available to instruct during the week. We are very privileged to have Murray onboard with his vast experience as a Grade 1 Instructor in both R.A. and G.A. categories.

A big thank you to Adam Price (Pricey) for his donation of the Television set for the Club House.

Keep these dates free for our Annual Dinner on Saturday 24th June and Friday 21st July 2017 for our Annual General Meeting . As you may have noticed nominations forms have been included for the Committee in this publication. The Annual Dinner is always a good opportunity to catch up with fellow Members.

Ballooning has started again this season and all is on track for the Championships in September, merchandise is available already. If you are looking for a pin for your collection, get in early and either purchase through National Ballooning website or contact me and I will put your order in.

MJ, I am curious to know how you are getting along with your aircraft recovery, aircraft maintenance can be a painful experience, you may want to put pen to paper.

It is great to see Ashley Smith doing his night rating, I noticed he picked the perfect evenings to do his night circuits. As Ashley admitted the flying side of it is easy it is the theory side that is the most challenging. Keep up the great work Ashley.

Cheers again, Errol

Our team NAC flying comp was Sunday 14th may.

"A bridge too far"

A cross country mini air trial with ground waypoints to be identified etc.
We flew from Northam to the west and toured various road bridges in the Avon Valley.
Each team nac pilot nominated his own time for the journey
So not a race just a safe little cross country to be enjoyed.
Team nac pilots who fly NAC comps each month
Keep their flight skills current, honed, and proficient.
This is evident in the close scoring on comp days!
We all enjoyed a lovely day and the excellent flying conditions.
Some of our visitors came up in our aircraft with us and a good time was had by all.
Judges:
Times: Shaun, Megan and junior member Mikayla!--
Radio: V.P. Matt Bignell ...
Runway: Ishaan Bhatia
Thank you judges, your work is highly valued!
Great morning teas: -Marg, Beth, and Megan - thank you ladies once again!

Results:

Equal First place	Ian Berry Peter Hill	VH-PGL VH-PGL	Cessna 172 Cessna 172
Equal Second place	H. Pietersie Ashley Smith	VH-CEU VH-CEU	PA28-235 PA28-235
Third	Trevor Sangston	VH-PGL	Cessna 172
Fourth	Dave Mcfarlane	VH-PGL	Cessna 172

All pilots flew well and flew safely, we had a good day.
Next comp is Sunday 11th june. Circuits x 3 with glide approach etc.
All pilots have a fully detailed comp sheet with 4 weeks to go as usual.
So lots of time to fly a practice circuit or three in the club aircraft eh?
Hope to see you all Sunday 11th June 9 am at Northam airfield for some very entertaining circuit work.

Seats are always available for those who would like to go up of course.

Until then, best wishes, thank you, and stay safe.

Peter Hill club captain 0450415947 prh@aurora.net.au

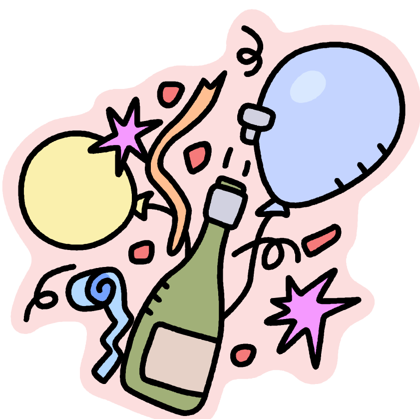
N A C Annual Awards Night

Saturday 24th June 2017

Bar Open at 7pm for pre-dinner drinks
Three course dinner starts at 7.30pm
Cost $45 per head

RSVP

Errol 0429 880 149 or Heather 0428 738 808
Or email
secretary@northamaeroclub.com



Nomination Form

Nomination is hereby made for the position of:

*President *Vice President *Secretary
*Treasurer

*3 x Committee Persons (2 year)
*1 x Committee Person (1 year)

Nominee ______________________________

Signature ____________________________

Position ______________________________

Proposer: ____________________________

Seconder: ____________________________

***To be in the hands of the Secretary by Friday 29th June 2017**

(PO Box 247 Northam WA 6401)

ANNUAL GENERAL MEETING

Notice is hereby given to the Members

Annual General Meeting

NORTHAM AERO CLUB

Friday 21st July 2017

NAC Club Rooms

7.30pm

AGENDA ITEMS

Election of Office Bearers

(Please bring a small plate of food for fellowship at the conclusion of the meeting)

VH-PGL

There has been some damage caused to the Spinner on the front of the Club Plane PGL.

No one knows who did it or how it got there but what is important is that we are all onboard with the correct parking up of the Club Plane.

Please ensure Club Aircraft is pushed right up the wheel chocks inside the Hangar before closing Hangar door.

*** *** *** ***

Ed's Update

(by Presidential Decree)

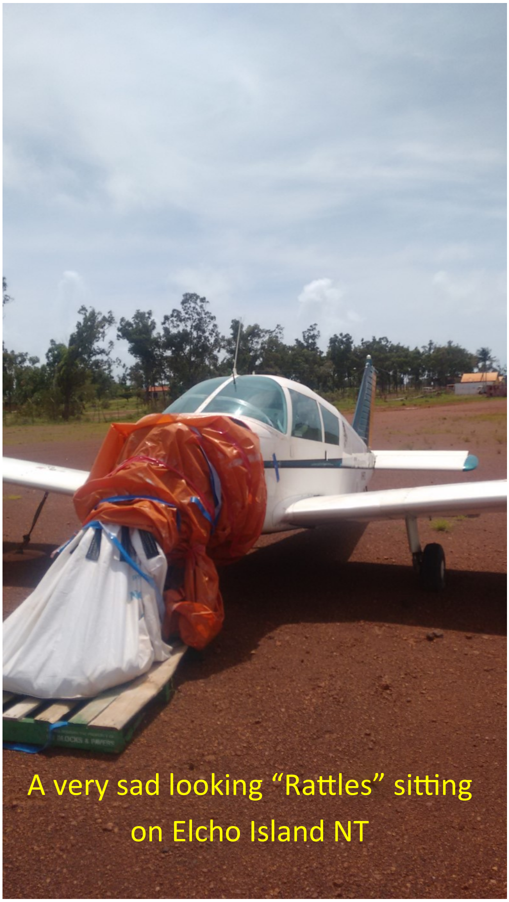
Well not much has happened to get my little aircraft off Elcho Island (VH-RTL). I have taken the step of purchasing yet another PA28 (VH-GWD) to obtain the engine, a Lycoming O-320-A3A. This engine has very low hours and is still in calendar time.

I am currently waiting on the LAME to remove the engine and transport it to Elcho for transplanting into VH-RTL. I will then fly RTL of the Island and back to Victoria for a thorough going over. Six months sitting on an island in the middle of the Arafura Sea can't be that good for her!

Whilst she is in Victoria her fully rebuilt engine will be installed and the O-320-A3A will be returned to Darwin to be reinstalled into VH-GWD. This aircraft too will make the long trip south for a good going over and refurb.

The third aircraft in the "fleet" is just about back in the air. VH-RXA has only the new windscreen to be fitted and she will be ready to go.

Whilst poor old VH-EDJ is still sitting in the container waiting for her new tail



A very sad looking "Rattles" sitting on Elcho Island NT

Welcome

We have four new members this month.   A new Instructor Murray Bow, instructing mid week, phone number of 0424 160 750. (Website is updated with his details for contact.)   Our other three new illustrious members are Heather Taylor, Mick Tierney and Neil O'Pray.

*** *** *** *** ***

Upcoming Events

Annual Dinner Awards Night

on

Saturday 24th June 2017

*** *** *** ***

Annual General Meeting

on

Friday 21st July 2017

*** *** *** ***

Fabulous 50th Anniversary

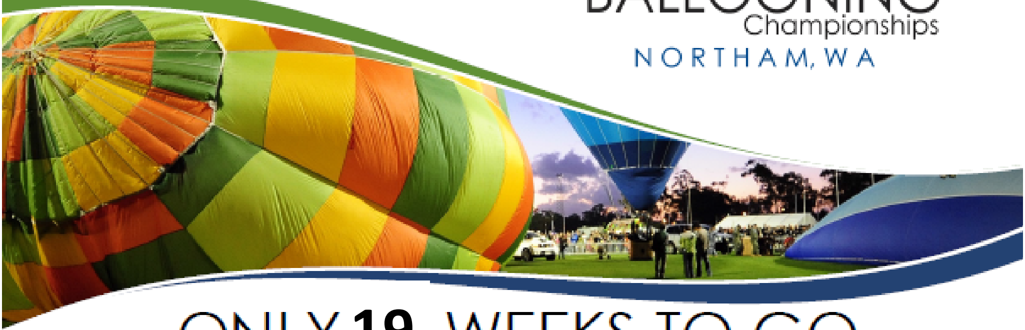
2018

*** *** *** ***

UPDATE

01 April 2017

2017 National BALLOONING Championships NORTHAM, WA



ONLY **19** WEEKS TO GO

The National Ballooning Championships 2017 will take place between 2 and 9 September 2017 in Northam. The event is just around the corner and the Planning Committee is busy making preparations for the event.

Business and Activity Opportunity

There will be an increased number of people in Northam during this event. This will provide the perfect opportunity to run an activity or to open your business as people will be looking for things to do, places to eat and things to see during their visit to Northam.

Contact the Shire of Northam's Community Development Officer, Michelle Blackhurst by email cdo@northam.wa.gov.au or telephone 9622 6100 so that we can assist you to market your activity to the community.

Pilot Registrations

Registrations for Balloon Pilots to attend are now open and the Committee has started to receive registrations from Pilots who will be attending.

Volunteers

Would you like to be amongst all the action and join us for a week of fun and do something you'll never forget? The Committee is searching for volunteers for the following tasks:

- Drivers with a 4WD who are able to tow a trailer with the balloon and basket and drive the pilot and crew to the launch field and retrieve the balloon once it has landed.
- Balloon Crew. You would be helping set up the balloon for launch and packing the balloon away once landed. This is a very physical task so you would be required to do some heavy lifting.

Training will be provided for all tasks.

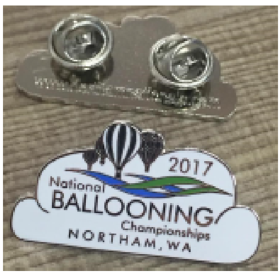
This is a great opportunity to get up close and personal where the action is and spend the week chasing balloons. Please only apply if you are available from 5am-9am and then 3pm-6pm, from the 2/9/2017 - 9/9/2017.

Merchandise

Limited edition Ballooning badges are now available for $5 (plus postage if required). These can be purchased from the Northam Visitor Centre or you can place an order for a badge via email bbacclements@bigpond.com.

Sponsorship Opportunity

The Planning Committee are offering a limited number of sponsorship opportunities. If you are interested in finding out more, please contact us via email northamballooning@gmail.com.



Engine Basics: Detonation and Pre-Ignition

Written by Allen W. Cline

Reprinted from Issue 54 of CONTACT! Magazine, published in January, 2000

PART II

CAUSES

Detonation is influenced by chamber design (shape, size, geometry, plug location), compression ratio, engine timing, mixture temperature, cylinder pressure and fuel octane rating. Too much spark advance ignites the burn too soon so that it increases the pressure too greatly and the end gas spontaneously combusts. Backing off the spark timing will stop the detonation. The octane rating of the fuel is really nothing magic. Octane is the ability to resist detonation. It is determined empirically in a special running test engine where you run the fuel, determine the compression ratio that it detonates at and compare that to a standard fuel, That's the octane rating of the fuel. A fuel can have a variety of additives or have higher octane quality. For instance, alcohol as fuel has a much better octane rating just because it cools the mixture significantly due to the extra amount of liquid being used. If the fuel you got was of a lower octane rating than that demanded by the engine's compression ratio and spark advance detonation could result and cause the types of failures previously discussed.

Production engines are optimized for the type or grade of fuel that the marketplace desires or offers. Engine designers use the term called MBT (Minimum spark for Best Torque) for efficiency and maximum power; it is desirable to operate at MBT at all times. For example, let's pick a specific engine operating point, 4000 RPM, WOT, 98 kPa MAP. At that operating point with the engine on the dynamometer and using non-knocking fuel, we adjust the spark advance. There is going to be a point where the power is the greatest. Less spark than that, the power falls off, more spark advance than that, you don't get any additional power.

Now our engine was initially designed for premium fuel and was calibrated for 20 degrees of spark advance. Suppose we put regular fuel in the engine and it spark knocks at 20 degrees? We back off the timing down to 10 degrees to get the detonation to stop. It doesn't detonate any more, but with 10 degrees of spark retard, the engine is not optimized anymore. The engine now suffers about a 5-6 percent loss in torque output. That's an unacceptable situation. To optimize for regular fuel engine designers will lower the compression ratio to allow an increase in the spark advance to MBT. The result, typically, is only a 1-2 percent torque loss by lowering the compression. This is a better trade-off. Engine test data determines how much compression an engine can have and run at the optimum spark advance.

For emphasis, the design compression ratio is adjusted to maximize efficiency/power on the available fuel. Many times in the aftermarket the opposite occurs. A compression ratio is "picked" and the end user tries to find good enough fuel and/or retards the spark to live with the situation...or suffers engine damage due to detonation.

Another thing you can do is increase the burn rate of the combustion chamber. That is why with modem engines you hear about fast burn chambers or quick burn chambers. The goal is the faster you can make the chamber burn, the more tolerant to detonation it is. It is a very simple phenomenon, the faster it burns, the quicker the burn is completed, the less time the end gas has to detonate. If it can't sit there and soak up heat and have the pressure act upon it, it can't detonate.

If, however, you have a chamber design that burns very slowly, like a mid-60s engine, you need to advance the spark and fire at 38 degrees BTDC. Because the optimum 14 degrees after top dead center (LPP) hasn't changed the chamber has far more opportunity to detonate as it is being acted upon by heat and pressure. If we have a fast burn chamber, with 15 degrees of spark advance, we've reduced our window for detonation to occur considerably. It's a mechanical phenomenon. That's one of the goals of having a fast burn chamber because it is resistant to detonation.

There are other advantages too, because the faster the chamber burns, the less spark advance you need. The less time pistons have to act against the pressure build up, the air pump becomes more efficient. Pumping losses are minimized. In other words, as the piston moves towards top dead center compression of the fuel/air mixture increases. If you light the fire at 38 degrees before top dead center, the piston acts against that pressure for 38 degrees. If you light the spark 20 degrees before top dead center, it's only acting against it for 20. The engine becomes more mechanically efficient.

There are a lot of reasons forfast burn chambers but one nice thing about them is that they become more resistant to detonation. A real world example is the Northstar engine from 1999 to 2000. The 1999 engine was a 10.3:1 compression ratio. It was a premium fuel engine. For the 2000 model year, we revised the combustion chamber, achieved faster bum. We designed it to operate on regular fuel and we only had to lower the compression ratio .3 to only 10:1 to make it work. Normally, on a given engine (if you didn't change the combustion chamber design) to go from premium to regular fuel, it will typically drop one point in compression ratio: With our example, you would expect a Northstar engine at 10.3:1 compression ratio, dropped down to 9.3:1 in order to work on regular. Because of the faster burn chamber, we only had to drop to 10:1. The 10:1 compression ratio still has very high compression with attendant high mechanical efficiency and yet we can operate it at optimum spark advance on regular fuel. That is one example of spark advance in terms of technology. A lot of that was achieved through computational fluid dynamics analysis of the combustion chamber to improve the swirl and tumble and the mixture motion in the chamber to enhance the bum rate.

CHAMBER DESIGN

One of the characteristic chambers that people are familiar with is the Chrysler Hemi. The engine had a chamber that was like a half of a baseball. Hemispherical in nature and in nomenclature, too. The two valves were on either side of the chamber with the spark plug at the very top. The charge burned downward across the chamber. That approach worked fairly well in passenger car engines but racing versions of the Hemi had problems. Because the chamber was so big and the bores were so large, the chamber volume also was large; it was difficult to get the compression ratio high. Racers put a dome on the piston to increase the compression ratio. If you were to take that solution to the extreme and had a 13:1 or 14:1 compression ratio in the engine pistons had a very tall dome. The piston dome almost mimicked the shape of the head's combustion chamber with the piston at top dead center. One could call the remaining volume "the skin of the orange." When ignited the charge burned very slowly, like the ripples in a pond,, covering the distance to the block cylinder wall. Thus, those engines, as a result of the chamber design, required a tremendous amount of spark advance, about 40-45 degrees. With that much spark advance detonation was a serious possibility if not fed high octane fuel. Hemis tended to be very sensitive to tuning. As often happened, one would keep advancing the spark, get more power and all of a sudden the engine would detonate, Because they were high output engines, turning at high RPM, things would happen suddenly.

Hemi racing engines would typically knock the ring land off, get blow by, torch the piston and fall apart. No one then understood why. We now know that the Hemi design is at the worst end of the spectrum for a combustion chamber. A nice compact chamber is best; that's why the four valve pent roof style chambers are so popular. The flatter the chamber, the smaller the closed volume of the chamber, the less dome you need in the piston. We can get inherently high compression ratios with a flat top piston with a very nice bum pattern right in the combustion chamber, with very short distances, with very good mixture motion - a very efficient chamber.

Look at a Northstar or most of the 4 valve type engines - all with flat top pistons, very compact combustion chambers, very narrow valve angles and there is no need for a dome that impedes the burn to raise the compression ratio to 10:1.

DETONATION INDICATORS

The best indication of detonation is the pinging sound that cars, particularly old models, make at low speeds and under load. It is very difficult to hear the sound in well insulated luxury interiors of today's cars. An unmuffled engine running straight pipes or a propeller turning can easily mask the characteristic ping. The point is that you honestly don't know that detonation is going on. In some cases, the engine may smoke but not as a rule. Broken piston ring lands are the most typical result of detonation but are usually not spotted. If the engine has detonated visual signs like broken spark plug porcelains or broken ground electrodes are dead giveaways and call for further examination or engine disassembly.

It is also very difficult to sense detonation while an engine is running in an remote and insulated dyno test cell. One technique seems almost elementary but, believe it or not, it is employed in some of the highest priced dyno cells in the world. We refer to it as the "Tin Ear". You might think of it as a simple stethoscope applied to the engine block. We run a ordinary rubber hose from the dyno operator area next to the engine. To amplify the engine sounds we just stick the end of the hose through the bottom of a Styrofoam cup and listen in! It is common for ride test engineers to use this method on development cars particularly if there is a suspicion out on the road borderline detonation is occurring. Try it on your engine; you will be amazed at how well you can hear the different engine noises.
The other technique is a little more subtle but usable if attention is paid to EGT (Exhaust Gas Temperature). Detonation will actually cause EGTs to drop. This behavior has fooled a lot of people because they will watch the EGT and think that it is in a low enough range to be safe, the only reason it is low is because the engine is detonating.
The only way you know what is actually happening is to be very familiar with your specific engine EGT readings as calibrations and probe locations vary. If, for example, you normally run 1500 degrees at a given MAP setting and you suddenly see 1125 after picking up a fresh load of fuel you should be alert to possible or incipient detonation. Any drop from normal EGT should be reason for concern.
Using the "Tin Ear" during the early test stage and watching the EGT very carefully, other than just plain listening with your ear without any augmentation, is the only way to identify detonation. The good thing is, most engines will live with a fairly high level of detonation for some period of time. It is not an instantaneous type failure.

PRE-IGNITION

The definition of pre-ignition is the ignition of the fuel/air charge prior to the spark plug firing. Pre-ignition caused by some other ignition source such as an overheated spark plug tip, carbon deposits in the combustion chamber and, rarely, a burned exhaust valve; all act as a glow plug to ignite the charge.
Keep in mind the following sequence when analyzing pre-ignition. The charge enters the combustion chamber as the piston reaches BDC for intake; the piston next reverses direction and starts to compress the charge. Since the spark voltage requirements to light the charge increase in proportion with the amount of charge compression; almost anything can ignite the proper fuel/air mixture at BDC!! BDC or before is the easiest time to light that mixture. It becomes progressively more difficult as the pressure starts to build.
A glowing spot somewhere in the chamber is the most likely point for pre-ignition to occur. It is very conceivable that if you have something glowing, like a spark plug tip or a carbon ember, it could ignite the charge while the piston is very early in the compression stoke. The result is understandable; for the entire compression stroke, or a great portion of it, the engine is trying to compress a hot mass of expanded gas. That obviously puts tremendous load on the engine and adds tremendous heat into its parts. Substantial damage occurs very quickly. You can't hear it because there is no rapid pressure rise. This all occurs well before the spark plug fires.

Remember, the spark plug ignites the mixture and a sharp pressure spike occurs after that, when the detonation occurs. That's what you hear. With pre-ignition, the ignition of the charge happens far ahead of the spark plug firing, in my example, very, very far ahead of it when the compression stroke just starts. There is no very rapid pressure spike like with detonation. Instead, it is a tremendous amount of pressure which is present for a very long dwell time, i.e., the entire compression stroke. That's what puts such large loads on the parts. There is no sharp pressure spike to resonate the block and the head to cause any noise. So you never hear it, the engine just blows up! That's why pre-ignition is so insidious. It is hardly detectable before it occurs. When it occurs you only know about it after the fact. It causes a catastrophic failure very quickly because the heat and pressures are so intense.

An engine can live with detonation occurring for considerable periods of time, relatively speaking. There are no engines that will live for any period of time when pre-ignition occurs. When people see broken ring lands they mistakenly blame it on pre-ignition and overlook the hammering from detonation that caused the problem. A hole in the middle of the piston, particularly a melt ed hole in the middle of a piston, is due to the extreme heat and pressure of pre-ignition.

Other signs of pre-ignition are melted spark plugs showing splattered, melted, fused looking porcelain. Many times a "pre-ignited plug" will melt away the ground electrode. What's left will look all spattered and fuzzy looking. The center electrode will be melted and gone and its porcelain will be spattered and melted. This is a typical sign of incipient pre-ignition.

The plug may be getting hot, melting and "getting ready" to act as a pre-ignition source. The plug can actually melt without pre-ignition occurring. However, the melted plug can cause pre-ignition the next time around.

The typical pre-ignition indicator, of course, would be the hole in the piston. This occurs because in trying to compress the already burned mixture the parts soak up a tremendous amount of heat very quickly. The only ones that survive are the ones that have a high thermal inertia, like the cylinder head or cylinder wall. The piston, being aluminum, has a low thermal inertia (aluminum soaks up the heat very rapidly). The crown of the piston is relatively thin, it gets very hot, it can't reject the heat, it has tremendous pressure loads against it and the result is a hole in the middle of the piston where it is weakest.

I want to emphasis that when most people think of pre-ignition they generally accept the fact that the charge was ignited before the spark plug fires. However, I believe they limit their thinking to 5-10 degrees before the spark plug fires. You have to really accept that the most likely point for pre-ignition to occur is 180 degrees BTDC, some 160 degrees before the spark plug would have fired because that's the point (if there is a glowing ember in the chamber) when it's most likely to be ignited. We are talking some 160-180 degrees of bum being compressed that would normally be relatively cool. A piston will only take a few revolutions of that distress before it fails. As for detonation, it can get hammered on for seconds, minutes, or hours depending on the output of the engine and the load, before any damage occurs. Pre-ignition damage is almost instantaneous.

When the piston crown temperature rises rapidly it never has time to get to the skirt and expand and cause it to scuff. It just melts the center right out of the piston. That's the biggest difference between detonation and pre-ignition when looking at piston failures. Without a high pressure spike to resonate the chamber and block, you would never hear pre-ignition. The only sign of pre-ignition is white smoke pouring out the tailpipe and the engine quits running.

The engine will not run more than a few seconds with pre-ignition. The only way to control pre-ignition is just keep any pre-ignition sources at bay. Spark plugs should be carefully matched to the recommended heat range. Racers use cold spark plugs and relatively rich mixtures. Spark plug heat range is also affected by coolant temperatures. A marginal heat range plug can induce pre-ignition because of an overheated head (high coolant temperature or inadequate flow). Also, a loose plug can't reject sufficient heat through its seat. A marginal heat range plug running lean (suddenly?) can cause pre-ignition.

Passenger car engine designers face a dilemma. Spark plugs must cold start at -40 degrees F. (which calls for hot plugs that resist fouling) yet be capable of extended WOT operation (which calls for cold plugs and maximum heat transfer to the cylinder head).

Here is how spark plug effectiveness or "pre-ignition" testing is done at WOT. Plug tip/gap temperature is measured with a blocking diode and a small battery supplying current through a milliamp meter to the spark plug terminal. The secondary voltage cannot come backwards up the wire because the large blocking diode prevents it.

As the spark plug tip heats up, it tends to ionize the gap and small levels of current will flow from the battery as indicated by the milliamp gauge. The engine is run under load and the gauges are closely watched. Through experience technicians learn what to expect from the gauges. Typically, very light activity, just a few milliamps of current, is observed across the spark plug gap. In instances where the spark plug tip/gap gets hot enough to act as an ignition source the milliamp current flow suddenly jumps off scale. When that hap-pens, instant power reduction is necessary to avoid major en-gine damage.

Back in the 80s, running engines that made half a horsepower per cubic inch, we could artificially and safely induce pre-ignition by using too hot of a plug and leaning out the mixture. We could determine how close we were by watching the gauges and had plenty of time (seconds) to power down, before any damage occurred.

With the Northstar making over 1 HP per cubic inch, at 6000 RPM, if the needles move from nominal, you just failed the engine. It's that quick! When you disassemble the engine, you'll find definite evidence of damage. It might be just melted spark plugs. But pre-ignition happens that quick in high output engines. There is very little time to react.

If cold starts and plug fouling are not a major worry run very cold spark plugs. A typical case of very cold plug application is a NASCAR type engine. Because the prime pre-ignition source is eliminated engine tuners can lean out the mixture (some) for maximum fuel economy and add a lot of spark advance for power and even risk some levels of detonation.

Engine developers run very cold spark plugs to avoid the risk of getting into pre-ignition during engine mapping of air/fuel and spark advance, Production engine calibration requires that we have much hotter spark plugs for cold startability and fouling resistance. To avoid pre-ignition we then compensate by making sure the fuel/air calibration is rich enough to keep the spark plugs cool at high loads and at high temperatures, so that they don't induce pre-ignition.
Consider the Northstar engine. If you do a full throttle 0-60 blast, the engine will likely run up to 6000 RPM at a 11.5:1 or 12:1 air fuel ratio. But under sustained load, at about 20 seconds, that air fuel ratio is richened up by the PCM to about 10:1. That is done to keep the spark plugs cool, as well as the piston crowns cool. That richness is necessary if you are running under continuous WOT load. A slight penalty in horsepower and fuel economy is the result. To get the maximum acceleration out of the engine, you can actually lean it out, but under full load, it has to go back to rich. Higher specific output engines are much more sensitive to pre-ignition damage because they are turning more RPM, they are generating a lot more heat and they are burning more fuel. Plugs have a tendency to get hot at that high specific output and reaction time to damage is minimal. A carburetor set up for a drag racer would never work on a NASCAR or stock car engine because it would overheat and cause pre-ignition. But on the drag strip for 8 or 10 seconds, pre-ignition never has time to occur, so dragsters can get away with it. Differences in tuning for those two different types of engine applications are dramatic. That's why a drag race engine would make a poor choice for an aircraft engine.

MUDDY WATER

There is a situation called detonation induced pre-ignition. I don't want to sound like double speak here but it does happen. Imagine an engine under heavy load starting to detonate. Detonation continues for a long period of time. The plug heats up because the pressure spikes break down the protective boundary layer of gas surrounding the electrodes. The plug temperature suddenly starts to elevate unnaturally, to the point when it becomes a glow plug and induces pre-ignition. When the engine fails, I categorize that result as "detonation induced pre-ignition." There would not have been any danger of pre-ignition if the detonation had not occurred. Damage attributed to both detonation and pre-ignition would be evident.
Typically, that is what we see in passenger car engines. The engines will typically live for long periods of time under detonation. In fact, we actually run a lot of piston tests where we run the engine at the torque peak, induce moderate levels of detonation deliberately. Based on our resulting production design, the piston should pass those tests without any problem; the pistons should be robust enough to survive. If, however, under circumstances due to overheating or poor fuel, the spark plug tip overheats and induces pre-ignition, it's obviously not going to survive. If we see a failure, it probably is a detonation induced pre-ignition situation.
I would urge any experimenter to be cautious using automotive based engines in other applications. In general, engines producing .5 HP/in3 (typical air-cooled aircraft engines) can be forgiving (as leaning to peak EGT, etc.). But at 1.0 HP/in3 (very typical of many high performance automotive conversions) the window for calibration induced engine damage is much less forgiving. Start out rich, retarded and with cold plugs and watch the EGTs!
Hopefully this discussion will serve as a thought starter. I welcome any communication on this subject. Every application is unique so beware of blanket statements as many variables affect these processes.

<u>*NAC Fellowship*</u>

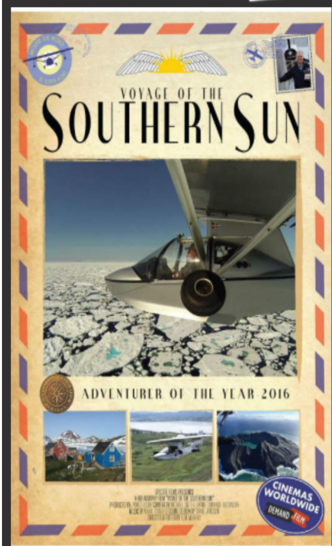
Catch up with friends at the Members Bar
on Saturday and Sunday nights
from
5.00pm to 7.00pm
great prices and good people, what more could you ask for.

Northam Aero Club, Withers Street, Northam

Drop in to find out what is happening around the Aero Club.

***   ***   ***   ***

DEMAND.FILM



VOYAGE OF THE SOUTHERN SUN

PROMOTED BY NICHOLAS CONNAN

Date: Wed, May 31, 2017 6:30 PM

Where: Hoyts Southlands
Southlands Boulevarde Shopping Centre, Willetton, Western Australia, 6155, Australia

You are invited to a special screening of the film Voyage of the Southern Sun at Hoyts Southlands

Tickets:

Adult: $20.00
Additional booking fee of $1.65 per ticket.

NAC
NORTHAM AERO CLUB

BAR ROSTER 2016—2017

FEBRUARY		
4th-5th	-	Crofty
11th-12th	-	Dave
18th-19th	-	Peter
25th-26th	-	Howie

MAY		
6th-7th	-	Crofty
13th-14th	-	Dave
20th-21st	-	Peter
27th-28th	-	Howie

MARCH		
4th-5th	-	Matt
11th-12th	-	Dave
18th-19th	-	Mike
25th-26th	-	Crofty

JUNE		
3rd-4th	-	Matt
10th-11th	-	Dave
17th-18th	-	Mike
24th-25th	-	Crofty

APRIL		
1st-2nd	-	Peter
8th-9th	-	Dave
15th-16th	-	Howie
22nd-23rd	-	Matt
29th-30th		Mike

JULY		
1st-2nd	-	Peter
8th-9th	-	Dave
15th-16th	-	Howie
22nd-23rd	-	Matt
29th-30th		Mick

Bar Hours

IF UNABLE TO DO YOUR ROSTERED DAYS PLEASE MAKE ARRANGEMENTS TO SWAP WITH SOMEONE

THE NORTHAM AERO CLUB (Inc.)
PO Box 247 NORTHAM

SURFACE MAIL
POSTAGE PAID
AUSTRALIA

TO:

"FLY ABOUT"
PRINT POST APPROVED PPN: 100018823

NEXT CLUB COMPETITION

9am Sunday 11th June 2017

The Northam Aero Club Committee meeting will be held at the club rooms on

Sunday 11th June 2017 at 1:00pm