DEC 76

TUCSON CORVAIR ASSOCIATION

Minutes of the Meeting
30 November 1976

1. The meeting was called to order by Frank McKenna.

2. Guests were introduced. There were 15 members present.

3. Minutes of the October meeting were read and approved.

4. The outing with the Cactus Corvair/Corvette Club was discussed and closer contact with the Phoenix club was recommended.

5. The success of the participation in Tucson's Wheelarama was reviewed and future entrance in local car shows was recommended.

6. A club jacket was selected and costs and type of embroidery were to be investigated. Action: Frank McKenna and John DiLauro.

7. The possibility of having another trip to Picacho Peak was discussed. Action: Frank McKenna.

8. John North volunteered to take over the responsibility of publishing the newsletter.

9. Bill Sears presented a chalk talk on the theory and operation of the Corvair turbosupercharger.

10. The raffle was won by David Royer.

11. The meeting was adjourned at 9:30.

****
The December meeting of the Tucson Corvair Association will be held December 28, 1976. The place is the same, Western Savings Building, 3002 North Campbell Ave., at the Northeast corner of N. Campbell and Blacklidge. It's across the corner from Cocos.
Time: 7:30 p.m.
****

TECH TALK FROM GEORGE TILLOTSON

At the November meeting, the 15 or so members were treated to a very good disertation on the effects of turbo-charging in changing the power curve by a more efficient charging of the cylinder. The net effect is a huge increase in output at higher RPM. You don't get this without some problems, as John DiLauro has found out in his winning dragster.

Burned and cracked pistons, bent rods, burned, bent valves and cocked valve seats, blown head gaskets all come in the course of getting gobs of power during the development states.

The development of the turbocharged engine for the Corvair was a bundle of compromises. The first of which required a lower compression ratio, retarded spark and, of course, high octane fuel. Valve timings tended to be mild as huge overlaps and duration in the valve timing cycle are not needed under mild charging as was needed for a production car.

There were other goodies added down deep, such as a nitrided alloy steel crank, larger section r` shanks, bi-metal exhaust valves, better s_ts for the valves and aluminum/bronze guides.

So far as can be determined, there was no change in the fin design on the heads to promote better cooling under high loadings. In fact, has there ever been any warning about prolonged high power running other than the admonition to heed the warning buzzers connected with the "thermister" head temperature warning system. The rapid heat build-up associated with high charging pressures is the most severe problem associated with turbocharging.

Charging pressures up to 23# PSI have been reported with detonation setting in. Damage soon results even on a 15 second run down the strip. As I understand, no pop-off valve for control of turbo pressures has been used. At Tucson's altitude, 23# would be about the equivalent of over 70 inches of mercury.

The Corvair original combustion chamber was a modified wedge design. It has the fairly large quench surfaces required under the Ricardo t`ories. However, a casual look at the much m_ified chamber as was designed for the Corvair turbocharged engine to achieve lower compression ratios is far from desirable under high pressures. According to Kettering theories, the quench areas should have a surface of approximately 23 per cent of the total piston area as projected. This was acceptable for CRs up to 12 to 1, if appropriate fuels were used.

There have been a number of approaches to the problems of detonation which include hemi chamber, twin ignition, intercoolers, injection of steam, water, alcohol. Most of the solutions involved compromises. Nearly every solution requires an economical approach

Since charging compresses the heat already in the air, and in the case of the Corvair, also compresses the fuel-air mixture, high pressures at 2½ atmospheres can easily cause temperature increases far above the level tolerated by combustion chamber design or fuel capabilities. To the engineer concerned with combustion in a confined space, his chief concern is activity at the so-called "flame-front".

This phenomenon begins with the ionization at the spark plug. The heating of each atom of fuel and air continues the combustion over the piston and across the chamber. However, the flame travel can get out of hand if the fuel/air mixture is too high on charging the cylinder and reaches near combustion temperatures before the spark occurs.

As the burning process progresses across the combustion chamber it pushes a pressure wave ahead of it. This is moving at a very high velocity and raises the mixture temperatures even higher, eventually causing an explosion rather than an even burning. THIS IS DETONATION! High heat is concentrated on adjacent surfaces. Softening and melting soon follow.

Mechanical damage from the pounding can soon follow and soon utter destruction.

For the Corvair none of the empirical solution seems easy other than reducing the compression pressures by lowering the charging pressures, the mixture temperatures, or going to exotic fuel.

continued...