ENGINEERING RENO’S
UNLIMITED RACERS

BY PETER LAW & DAN WHITNEY
Dan Whitney – Engineering Support for Warbirds
Professional Mechanical and Nuclear Engineer
  • MSME - Stanford University
Served in USAF, 1965 – 1969
  • Chief of Aircraft Maintenance, C-130E
Retired from electric utility industry
Author of: *Vee’s for Victory! The Story of the Allison V-1710*
  Author of many articles in aviation magazines and journals
  Author of Aviation Museum Books, Aviation photographer
Aircraft Engine Historical Society (AEHS) – Vice President
Aerospace Museum of California - Past President
Provides engineering support for *Merlin & Allison* engines
  • Engineering engine support systems: oil, coolant, ADI
  • FAA Approved modifications and replacements for:
    • Propellers, Pistons, Rings, Bearings, Plating, Seals, Gaskets
    • Valves, Valve Springs, Liners, Ignition Systems, Sparkplugs
Dan Whitney’s Books

- Vee’s For Victory!
  The Story of the Allison V-1710 Aircraft Engine
  1929-1948
  Daniel D. Whitney

- ENGINES of the Aerospace Museum of California
  Daniel D. Whitney
Dan Whitney’s Books

Aerospace Museum of California
McClellan Field, Sacramento, CA
Some of Dan Whitney’s Projects

MT Propeller 4-blade P-82 prototype on P-51A

2-Stage V-1710-G6 for P-82E
- By Allison Competition Engines
- Engr. for Speed Density Carb
- Calibration with all new soft parts
- 110-hour Propeller Cert Test Prog.
- Demo new pistons, liners, valves
ENGINEERING PAST & PRESENT UNLIMITED RACERS

BY PETER LAW
Peter Law – Who is He and Where Did He Work?

• BSME – Stanford University, 1958. Majored in Thermodynamics
• MSAE – University of Southern California (USC), 1965
• Registered Professional Mechanical Engineer in California & Washington
• Member SAE and AIAA
• Thermodynamics Engineer at Lockheed-Burbank & Palmdale since January 1959; Entire Career of 42.5 years at Lockheed
• Transferred to Lockheed Skunk Works in July 1961
• Skunk Works Thermodynamics Department Manager from 1980
• Retired from Lockheed July 2001 after 40 years at Skunk Works
• Worked on F-104, A-12, YF-12A, SR-71, M-21, D-21, U-2, F-117A, F-22, JSF(X-35), and many other Classified Projects
• Did internal and external Heat Transfer and Thermodynamics, Structural Thermal Analysis, Cooling System Design, and Internal Subsystem Thermal Analysis, including hydraulics, fuel, and other systems
• Involved in Piston Engine Aircraft Racing since 1964
• Involved in Unlimited Hydroplane Racing since 1970
Peter Law - *What Does He Do?*

- Involved in Unlimited Racing since 1964
- Started with Darryl Greenamyer, Lockheed A-12 & SR-71 Test Pilot, in 1964 after First Reno Races
- Involved then and since with Bruce Boland
- Boiled ADI Fluid to Cool Oil & Reduce Drag on Darryl's Bearcat Starting at Reno 1965
- Built Water Injection Systems for P-51s & other Aircraft since 1970 through Al DiMauro & Aircraft Carburetor
- Flow Check & Adjust Carburetors for most Unlimited Aircraft Since 1978, when Aircraft Carburetor Terminated
- Design & Build Spray Bars for Oil & Engine Cooling, plus other Engineering since 1970
Peter Law - What Has He Worked On?

• Started with Darryl Greenamyer's Bearcat
• Worked with Bruce Boland on several more
  – Dave Zeuschel P-51 & Miss America P-51 in 1,000 Mile Races
  – Candace (Cliff Cummins), Jeannie (Mac McClain)
  – Red Baron P-51, Merlin & Griffon
  – Ciuchetton, Cloud Dancer, Georgia Mae, Ridge Runner
  – Dago Red, Original Strega, Stiletto, Super Corsair
  – Tsunami, Risky Business, Huntress III & More
  – Help on Rare Bear, Dreadnought
• Unlimited Division Contributions
  – Division Secretary-Treasurer for 2 years
  – Division Newsletter for Several Years (with Joanne)
  – Records Keeper & Pilot's Qualification Secretary
  – Unlimited Hydroplane Involvement
Pete with Bruce Boland, designer of the SUPER-CORSAIR
Darryl Greenamyer running-up his *Smirnoff* Bearcat
Darryl pointing out the additional sponsors of his Championship Smirnoff Bearcat
October 1969 - Darryl being congratulated on setting the new World Record of 483.041 mph by the previous holder Fritz Wendel (469.22 mph in 1939), along with Lockheed’s Tony LeVier
FREEZING POINTS FOR MIXTURES
OF METHYL ALCOHOL AND WATER

NOTE: "PARTS ALCOHOL" AND "PARTS WATER" ARE PARTS BY VOLUME MEASURED BEFORE MIXING AT 70°F.
OIL COOLING SYSTEM SCHEMATIC

RACING F8F BEARCAT - CONQUEST

TYPICAL WATER BOILER SYSTEM FOR RADIAL ENGINE APPLICATIONS
WATER REGULATOR SYSTEM SCHEMATIC
SYSTEM FOR MERLINS, GRIFFONS, AND SOME R-3350'S
(SEVERAL P-51's, RED BARON, SEPTEMBER FURY, CRITICAL MASS, OTHERS)
WATER REGULATOR MOUNTED ON SIDE OF R-2800 ENGINE

PRATT & WHITNEY AIRCRAFT

DECREASEMENT VALVE

VARIABLE WATER-AIR RATIO REGULATOR

MOCK-UP OF THE DOUBLE WASP LA SERIES ENGINE WATER INJECTION SYSTEM
WATER REGULATOR CONNECTIONS

ISOMETRIC REPRESENTATION SHOWING STANDARD CONNECTIONS
(USE ON MOST AIRCRAFT OTHER THAN P&W ENGINES)

- Water Outlet Location (to water discharge hose)
- Drill and tap for 1/4" NPT to -8AN fitting

- 'D' Chamber from Carburetor
- 1/2" NPT to AN-4

- Jet Access Cover Plug

- Water Inlet Location
- 5/8" NPT to -8AN fitting

- Mounting Surface

- Derichment Line and ADI Pressure Ports
- 1/4" NPT to AN-4
THE GALLOPING GHOST
R-R Griffon Powered Red Baron #5, Reno 1977
R-4360 Powered *Dreadnought* #8
R-4360 Sea Fury Furias #15, Reno 1984
Stiletto #84, Reno 1992 Water Boiler Cooling
Tsunami #18 at Reno
Rare Bear, 2011
R-3350 Powered Sea Fury *Critical Mass* #10
R-3350 Powered *September Fury* #232, Reno 2004
September Fury #232, Reno 2008
RED BARON RECORD TEAM

Punch a Hole Thru a Cloud
My Very Best Wishes
Cheers and Good Luck!

Ed Browning
PILOT
Darryl G. Greenamura

Roger Davies
CREW CHIEF
Roger Davies
Darryl Greenamyer’s Record Setters:
F-104 *Starfighter* (988.26 mph) and
F8F *Bearcat* (483.041 mph)
Pete Law
Lifetime Achievement Award
from
Unlimited Division
2011