CANYON SPACE TEAM

CST Newsletter Editor
Bruce E. Watson
P.O. Box 70
Kahlotus, WA 99335-0070

Phone: 509-282-3341
Email: secretary@canyonspaceteam.org

CANYON SPACE TEAM

http://www.canyonspaceteam.org

The primary goal of the Canyon Space Team is to support low cost, private, human access to space (sub-orbital, semi-ballistic flight) including research and development.

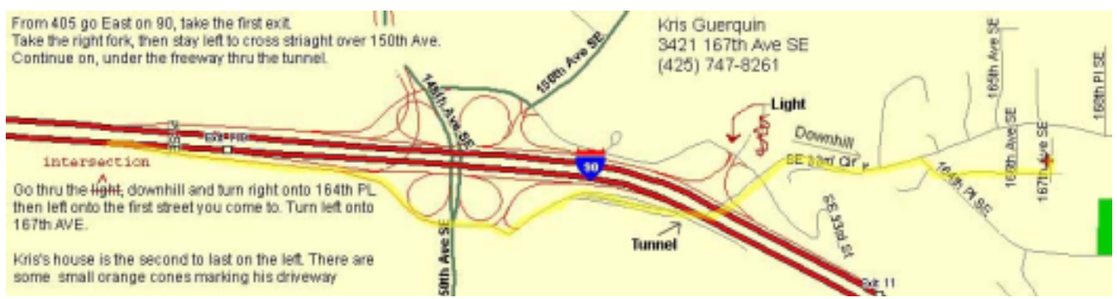
President	Rich Harman 2211 172nd PL SE, Bothell, WA 98012	425-922-7761
Vice President	Kim Powell 3483 Best Lane, Bellingham, WA 98226	360-592-1152
Treasurer	Rich Collingwood 41512 SE 131st Street, North Bend, WA 98045	
Secretary	Bruce E. Watson P.O. Box 70, Kahlotus, WA 99335	509-282-3341

August 2001 General Meeting

Place: Kris Guerquin's home

Date: Sunday
August 12, 2001

Time: Noon



Directions on how to get to Kris Guerquin's house

Canyon Space Team

CST Newsletter

Volume 1, Issue 4 August, 2001

References

This issue is dedicated to describing several excellent references on rocket and rocket engine design and construction. Three of these are available for downloading on-line.

Inside this issue:

President's Report
Rich Harman

The last few weeks has been somewhat quiet here. All the regulars that are working on the S4V either had vacation or are on vacation now. Still, progress was made. The molds were taken off the S4V bottom plug last week. Unfortunately we had a problem with the gelcoat wrinkling on the bottom section. Approximately 20% of the bottom piece is affected, the cause of this is a mystery, the other two pieces are fine and repairs are underway. This mold is for the entire undersurface of the fuselage/wing (one piece) and the top surface of the wings (two pieces).

The S4V will require all together seven pieces. We now have five completed. The last two will be for the vertical stab, by far the simplest to make.

Thanks to the swap shop at Arlington (and Janda, he paid for it) we now have an oxygen cylinder. We now have all the hardware required to fire the Hypertek hybrid motors. Now we need to fashion a launch rail or tower. We will need a rail 10' to 12' long with a tee slot running the full length. If anyone has any ideas on where to find this please let us know. They are available commercially for between $200 and $300.

The canyonspaceteam.org domain registration was renewed for another two years and some minor changes were made to the website.

On a personal note, my rocket (I really need to think of a name for it) *may* be ready for the September 2nd launch at Monroe, Washington. I will be attempting to first earn a Level 1 certification, then fly again for Level 2. I hope there is a lot of CST members present to witness this accomplishment (or learning experience :-o) and maybe help take some pictures. ;-)

"It is difficult to say what is impossible, for the dream of yesterday is the hope of today and the reality of tomorrow."

Dr. Robert H. Goddard

Treasurer's Report
Rich Collingwood

Treasurer's report as of 8/04/01:

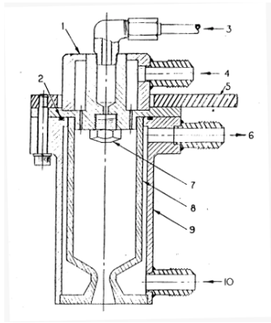
Checking Balance:	$383.76
Savings Balance:	$000.11

No Activity in the treasurer's report since the last newsletter.

How to Design, Build and Test Small Liquid-Fuel Rocket Engines

by Leroy J. Krzychi, 1967, Rocketlab, SBN 9600-1980-4 (out of print).
http://www.im.lcs.mit.edu/rocket/

From the Foreword of the book:
The rocket engine is a relatively simple device in which propellants are burned and the resulting high pressure gases are expanded through a specially shaped nozzle to produce thrust. Gas pressurized propellant tanks and simple propellant flow controls make operation of a small liquid-fuel rocket engine about as simple as operating an automobile engine. Why then do so many amateur rocket engines fail or cause injury? The reason, usually and simply, is that the amateur is not accustomed to high pressure devices operating near material temperature limits. His normal everyday life is, instead, filled with devices and gadgets operating at low pressures and at low thermal energy levels. With proper design, careful workmanship, and good test equipment operated in a safe manner, the amateur can build small liquid-fuel rocket engines which will have hours of safe operating life.



Assembly drawing of small liquid-fuel rocket engine. (1) injector assembly, (2) O-ring, (3) liquid fuel, (4) gaseous oxygen, (5) engine mount, (6) coolant, (7) Fuel spray nozzle, (8) combustion chamber, (9) outer shell, (10) coolant.

The purpose of this publication is to provide the serious amateur builder with design information, fabrication procedures, test equipment requirements, and safe operating procedures for small liquid-fuel rocket engines.

Rocket Propulsion Elements

by Oscar Biblarz, George Paul Sutton

Book Description
This is the Sixth Edition of the leading textbook on rocket propulsion for courses in aerospace engineering. It covers the basic physical principles of rocket propulsion such as nozzle thermodynamics, heat transfer, flight performance, and fuel chemistry. It also includes the design rationale of components such as nozzles, fuel chambers, structures, and control systems. All rocket types are covered, i.e., liquid, solid, hybrid fueled, and electric propulsion systems. -- *This text refers to the Hardcover edition.*

Book Info
A comprehensive and coherently organized text on the factors that shape rocket propulsion, considering both theory and practical design. Includes the most current information on engine structures, nozzle theory, gas properties, thrust chambers, and launch vehicles. Also includes over 340 illustrations, including tables and graphs.

Modern Engineering for Design of Liquid-Propellant Rocket Engines

by Dieter K. Huzel, David H. Huang, *Progress in Astronautics and Aeronautics Vol. 147* Hardcover, 431 page(s), ISBN or Order Number: 1-56347-013-6, Copyright: 1992. List Price: $109.95 AIAA Member Price: $89.95

From the component design, to the subsystem design, to the engine systems design, engine development, and flight-vehicle application, this how-to text bridges the gap between basic physical and design principles and actual rocket-engine design as it's done in industry. More than 470 illustrations and tables help to make this book a must-read for advanced students and engineers active in all phases of engine systems design, development, and application, in industry, and in government agencies.

(Continued on page 3)

(Continued from page 2)
Table of Contents

NASA Space Vehicle Design Criteria SP-8000

http://library.msfc.nasa.gov/cgi-bin/lsp8000

The purpose of these monographs is to organize and present, for effective use in design, the significant experience and knowledge accumulated in development and operational programs. They review and assess design practices, and from them establish firm guidance for achieving greater consistency in design, increased reliability in the end product, and greater efficiency in the design effort. The monographs are organized in two major sections that are preceded by a brief introduction and complemented by a set of references.

The State of the Art, section 2, reviews and discusses the total design problem, and identifies which design elements are involved in successful design. It describes succinctly technology pertaining to these elements. When detailed information is required, the best available references are cited. This section serves as a survey of the subject that provides background material and prepares a proper technological base for the Design Criteria and Recommended Practices.

The Design Criteria, shown in italics in section 3, state clearly and briefly what rule, guide, limitation, or standard must be imposed on each essential design element to assure successful design. The Design Criteria can serve effectively as a checklist of rules for the project manager to use in guiding a design or in assessing its adequacy.

The Recommended Practices, also in section 3, state how to satisfy each of the criteria. Whenever possible, the best procedure is described; when this cannot be done concisely, appropriate references are provided. The Recommended Practices, in conjunction with the Design Criteria, provide positive guidance to the practicing designer on how to achieve successful design.

Both sections have been organized into decimally numbered subsections so that the subjects within similarly numbered subsections correspond from section to section. The format for the Contents displays this continuity of subject in such a way that a particular aspect of design can be followed through both sections as a discrete subject.

The design criteria monograph is not intended to be a design handbook, a set of specifications, or a design manual. It is a summary and a systematic ordering of the large and loosely organized body of existing successful design techniques and practices. Its value and its merit should be judged on how effectively it makes that material available to and useful to the designer.

Astronautic Structures Manual (On-Line)

http://trs.msfc.nasa.gov/mtrs/75/asm.html#ASMVol1

This document (Volume I, II, and III) presents a compilation of industry-wide methods in aerospace strength analysis that can be carried out by hand, that are general enough in scope to cover most structures encountered, and that are sophisticated enough to give accurate estimates of the actual strength expected. It provides analysis techniques for the elastic and inelastic stress ranges. It serves not only as a catalog of methods not usually available, but also as a reference source for the background of the methods themselves.

An overview of the manual is as follows: Section A is a general introduction of the methods used and includes sections on load, combined stress, and interaction curves; Section B is devoted to methods of strength analysis; Section C is devoted to the topic of structural stability; Section D is on thermal stresses; Section E is on fatigue and fracture mechanics; Section F is on composites; Section G is rotating machinery; and Section H is on statistics.