Troubled Times

Team Work

Click on the icons above to go to your area of interest.

Troubled Times

TEAM: LEDs

Light Limits experiment is underway. John's Quantum Snaplite experiment reports success in growing plants with this LED array. Steve F's plan to assembly inexpensive LED Arrays.

For information contact Mike, Steve F, or Steve K.

Troubled Times

TEAM: Windmill

The Windmill TEAM is brainstorming inexpensive ways to harness the wind. Early thoughts are:

- to use Flappers,
- a Dome Sails acting as a Turbine Hub, which has Drawbacks
- a Sphere Shape
- using Available Parts, for the costly Rotating Parts
- Focus the wind into a Funnel, like a Jet Engine facing Into the Wind

Contact Michel, Roger, Rob, Doug, or Jeremiah for more info on TEAM activities.

Troubled Times

TEAM:  Steam

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A Troubled Time TEAM has been formed to explore development of Aftertime steam engines, constructed from available materials, such as the possibility of Wood Burning turbines. Ron has started a Prototype of a Inexpensive steam engine, with the Objectives and Design 1, Design 2, and Design 3 formulated. Discussion on Rust problems, Piston power, Distilled Water potential, and Diesel engines.

For information on developing TEAM activities, contact Clip.

Troubled Times

TEAM: 

Hydroponics

A Troubled Time TEAM has been formed to share practical tips on home hydroponics. Early reports, concerns, and ideas are:

- Success & Failure
- PVC Pipe
- Nutrients
- pH Balance
- Alaska Hydroshed
- Teeter Totter
- Q&A

For information on developing TEAM activities, contact Clipper, Roger, or Steve.

Troubled Times

TEAM: 

Geodesic

Joe has been experimenting with a portable and easily assembled Geodesic dome frame made from Pipes and secured by Stringing. Another team member is building a Geodesic Hothouse, using Reflective Material. Home made domes from conduit and Plywood are serviceable. Erik is working on CAD Models.

For more information on TEAM activities, contact Travis.

Troubled Times

TEAM:  Domes

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The dome shape offers many advantages, but for many is out of reach. Some Troubled Times members are struggling with a method whereby survivors could build their own domes, inexpensively. Current designs are:

- Joe's Geometric Dome
- Ron's Dirt Mound
- Step-by-Step development
- Dome Punt
- Donut Shape dome

Troubled Times

TEAM: Colloidal Silver

Several Troubled Times members make their own Colloidal Silver. TEAM topics are:

- Testimonials
- Michel's Travails, with Pat's Answer and Mike's Answer
- Tian's Travails, with Various Answers
- Aron's Travails, with Wire Answers and Laser Answer
- Not Sophisticated
- Step-by-Step, with Mike's Concerns about Voltage and PPM Dosage
- Optimum Settings, Measuring PPM, and Solar Cell
- Silver Sources and Silver Wire
- Beginner's Q&A

Contact Educate-Yourself, Mike, or Pat for more info on TEAM activities.

Troubled Times

TEAM:  Lead Poisoning

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Struggling to discover an affordable yet reliable lead testing kit, Mike has suggested an Experiment.

For more information on TEAM activities, contact Mike.

Troubled Times

TEAM:  Radio

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A Troubled Time TEAM has been formed to foster support for an Internet supported by short wave radio and other uses of short wave radio.

- Frequencies
- Ham Classes
- Coordination
- Call Signs

For information on developing TEAM activities, contact Jan or Helena or Mike.

Troubled Times

TEAM: Slowing

The Earth's slowing rotation in response to the approaching 12th Planet is becoming noticable.

For those who would like to sync watches and compare notes, a method of Keeping Track has been devised. These clock times will be compared against the official NIST date. This project has Benefits. Sync times are Apr 15th, 1998, Jul 12, 1998, Oct 25, 1998, Jan 3, 1999, Apr 4, 1999, Jul 11, 1999, Oct 31, 1999, Jul 9,2000, Apr 1, 2001, Oct 28, 2001.

Mike has discovered that based on the Atomic Clock being set and reset by the Navy, as all these clocks worldwide sync with the Navy clock automatically, the data collected by the TEAM to date shows a Slowing Trend! Mike's charts, recently Updated on:

Watched Clocks/Atomic Clocks difference: A1 (2nd Integral), A2 (1st Derivative), A3 (2nd Derivative)
Watched Clocks Majority/Atomic Clocks Difference: B1 (2nd Integral), B2 (1st Derivative), B3 (2nd Derivative)
Casio Wristwatch/Atomic Clock Comparison: C1 (2nd Integral), C2 (1st Derivative), C3 (2nd Derivative)
Summary and Projection: D1 (2nd Integral), D2 Estimated Slippage, D3 by May 15, 2003

show this, so that Future Trends can be hypothesized.

For information on developing TEAM activities, contact Mike.

Troubled Times

Light Limits

Steve's photobioreactor experiments is underway, using LEDs and algae, O2 and CO Monitoring, Adjustments, Algae Production, a Photobioreactor, and a Closed Ecology.

Troubled Times

Quantum Snaplite

Plant Study using aggregate soils and LED lighting.

Purpose

To test the ability of a strictly LED (light emitting diode) source to produce plant life from seed, and to test the LED's coverage capacity to create such life.

Desired Outcome

A new and reasonably cost-effective way to grow plants with limited energy output.

Starting Conditions

Day 1: September 9, 1998

Progress

Day 5: September 13, 1998
Day 6: September 14, 1998
Day 7: September 15, 1998
Day 8: September 16, 1998
Day 12: September 20, 1998
Day 17: September 25, 1998
Day 22: September 30, 1998
Day 30: October 8, 1998
Day 35: October 13, 1998
Cost Compare: at Day 35
Day 38: October 16, 1998
Day 40: October 18, 1998
Day 43: October 21, 1998
Day 53: October 31, 1998
Cost Changes: at Day 53
Day 58: November 5, 1998
Day 71: November 18, 1998
Cost Changes: at Day 71

John

Glad somebody is doing this. LED's are cheap, take very little current and can last a very long time. They do emit light in a very narrow bandwidth though. It would be interesting to do a spectral analysis of this light array to see how it stacks up against natural sunlight. I'm sure there would be many peaks and gaps as compared to ordinary light. Nevertheless, this might be the most profitable source of lighting for the Dark Times ahead.

Robert

There are certain light frequencies that research has shown plants respond to. Red and Blue light are those frequencies. NASA has done the research already and this product from Quantum was what NASA used.

John


The
Hub

Troubled Times

LED Arrays

Steve F is exploring the cost of putting together his own LED Array with Bill Mack, and LED Cost.

Troubled Times

Flappers

Hey, check this out. (I'm saving the information, if it doesn't work then I'll provide it.) Look at the bottom of the page, he says if you make a large enough "flapper", you might actually create lethal amounts of voltage. A generator like this would be perfect for a windmill, because you could design one to *be* the windmill. So instead of a windmill driving a generator, you just use the rotating part as the "wing".

The problem to overcome would be to allow full rotation, instead of flapping motion. High voltage like this can be used to power neon bulbs, possibly other types. Would be nice to find out how to make a homemade "neon" bulb that could be powered with a non-standard device like this. I think your muscles are electrostatic motors driven by chemical reactions, but this would be an electrostatic generator. The human body is an advanced machine, so if it uses electrostatic anything it's probably better. As far as generation is concerned, the body generates measureable electricity as well - if only a by-product of something more efficient happening. Put volt-meter probes to your temples or spine, the readings get higher there on both AC and DC settings.

I'll probably soon make a small model that can spin 360 degrees instead of flap. (small to be safe) and see how good it lights up LED's or small neon bulbs, so I'll keep you posted.

Offered by **Joe**.

Troubled Times

Dome Sails

I still need to put pictures up and directions, but before I was ranting about how it's easy to make a geodesic dome framework (model) from "string & straws" because you don't have to measure angles. What if you made a very large, lightweight geodesic sphere framework from thin pipes, and arranged "sails" on the inside to catch the wind, thus turning the whole contraption. If you had nice ball bearings at the base, you could pull a wheel-of-fortune and spin the thing real hard to start it up.

The idea is that the larger your sails, the more air you'll catch. (more surface area = increase likelyhood to catch wind currents). The geodesic construction would afford you the possibility to make a truely immense power generator with a pretty straightforward construction method. The wind should easily turn such a device since the sails' surface areas will greatly overcome the low suface area and mass of the light framework. Also, the geodesic shape will allow a very strong lighweight construction to be had that won't likely fall apart.

Very large constructions are possible, like 50 feet in diameter or more. Plastic PVC might work well, or light steel pipe with thin walls. You just need a larger pole in the center in proportion to the size of the globe. One point to ponder is how to position the sails on the inside to encourage horizontal rotation, and not the vertical rotation that would try to tip it over. I'm thinking vertically oriented sails would probably take care of this if the sails were fatter at the equator and got thinner at the poles.Hard to explain, I'll have graphics up soon hopefully. (the geodesic is a hard thing to model in 3D)

Offered by **Joe**.

No, in fact you can even get more power from a dome mounted, thin shell concrete dome, wind turbine. This is because in order to make the turbine that big and responsive to the winds it has to have a massive support. Voila, a thin shell concrete dome provides an excellent support and very little interference for a massive wind turbine. I can't remember exactly where I'd heard about this, might try Monolithic Dome's website. www.monolithicdome.com

Offered by **Jeremiah**.

Troubled Times

Turbine Hub

The sails need to be attached to a hub then inside the geodesic framework. Together they best be put into the position that of the blades of a rotor/turbine, as the blades in a jet-engine! Put the entire structure on a rotating basis, just like a wind arrow rotates along with the wind. Have the structure hanging in a similar structure that is attached to the base. This way, the geodesic framework is free to rotate in any direction and will not be tipped over, as the wind will adjust the position of the framework due to it's pressure on the sails inside.

But as I said, lets build a model, or even better a couple of models, and test out different shapes, sizes and positions of sails, and even sail-flexibility and the flexibility of the entire structure. Where it needs to be rigid and where it needs to be flexible. Bamboo is great for large models! Would we be able to grow bamboo? If so, this would be great for building furniture, strengthening structures, making structures and even piping to lead water through.. there are other uses too and they grow a couple of centimeters a day. Bamboo shoots are edible. How about this?

Offered by **Michel**.

Troubled Times

Drawbacks

Technically, no additional energy is wasted using this concept than with any other windmill concept. That is if everything is perfect in both cases there is no additional energy loss. First, this dome-windmill will be very sturdy. But, it will also require a high start-up wind speed. Once is gets turning, it will probably wobble from imperfections in the dome build and wind forces hitting parts other than the blades. This can be compensated by building a trackway for the rim to run in; however, this means friction losses.

Another problem will be the reason windmills are designed the way they are. The wind stream is disrupted close to ground level by trees, hills, etc. To get around this, the actual windmill is placed 50-100 ft above the surrounding landscape. In order to reach this strong wind, a very large dome would be required; say 50-100 ft radius. A lot of energy would be wasted in turning this entire structure.

However, there is one situation where this dome-windmill would be very useful. The winds accompanying the pole shift. Build the dome very large and extra sturdy, and build it in land as clear and flat as possible. Set it so that the produced energy is used to electrolyze water and compress, or liquefy, the resulting hydrogen and oxygen. The oxygen can either be used in a sealed dome's atmosphere, or can simply be vented off.

One other side note, this dome-windmill won't be quite that inexpensive.

Offered by **Jeremiah**.

Troubled Times

Sphere Shape

I was thinking more of a full geodesic sphere, with a large shaft running through the middle. Sorry if I said dome. The whole sphere would be lots stronger than a dome overall I think. But those are good thoughts and probably true nevertheless. I was mainly thinking that a very large structure, built light enough to spin easily in the wind, would be possible. I could be wrong, but wouldn't something large enough catch air currents and turn even on a seemingly calm day? I've been wondering if there's some shape or container you could make, that would amplify the circular motion of the air currents inside. Like a device that lets air come in from any side, but directs it to form a 'tornado' in the center. Kinda like that fresnel lens - taking in diffuse light and focusing it to a point. Can we 'focus' the wind likewise?

Generators can be made pretty light, I think. The regular wind can turn them, but focusing the power of the wind to a small area could spin a generator very fast. And you would only need a large stand-still box with a small protected generator inside - no big moving blades or sails on the outside. A smaller generator spinning very fast would probably provide more power than a large inefficient structure spinning slowly or not at all. Our eyes focus light, and our ears focus sound, so why not wind? Of course I have absolutely no idea how to do it yet.

Offered by **Joe**.

Yes there is, a man named Viktor Schauberger invented one. You described exactly what it does. There is a lot of stuff about him and his ideas on the net. I don't have any addresses on hand; just try any of the search engines.

Offered by **Jeremiah**.

Are you perhaps thinking about those spherical vent covers that rotate while venting heat out of your attic? (I think that's how they work.) The current wind generator technology works best in light winds (10 to 15 mph) and they recommend that you shut them down and lock the blades in winds greater than 25 mph.

Offered by **Roger**.

Troubled Times

Available Parts

An even smarter idea would be to try to spring for a $5000 generator built by professionals. They give out like 5-10kW, which is enough for a well pump.

Part of the reason we need these ideas is because so many of us don't have the resourse$ to buy the generators built by the "profesionals". If we are indeed going down the wrong track then perhaps we need to find the plans to one of these generators and build them ourselves with more readily available parts. If a company is selling them for $5,000 I would bet that $4,000 of that went to labor and profit. Besides, it would do us all some good to study how generators work and new ways of building them because there may not be many "professionals" around in the near future to build or maintain them.

P.S. I don't feel that anybody should throw away their plans or give up their laymen ideas because of what "educated professionals" tell you about what works and what doesn't. Some of the best ideas and inventions have come from the minds of laymen.

Offered by **Doug**.

Troubled Times

Rotating Parts

I agree with you. But the main reason that these things are so expensive is that they use custom molded and machined parts - especially rotating parts. I took a course in engineering dynamics in school last semester and this is definetly the hardest thing to build - the rotating part. Things spinning at 1000-2000 RPM (what you need to get 60Hz AC directly) need to be balanced. I agree that we should *not* depend on any major companies and I really don't want to spend the $5000 on a commercially avaliable mill.

Does anyone know of any materials (plastic, metal) that can be easily shaped into fins or rotors? If we could find some stuff that didn't require a million dollar laser lathe that the corps use then a layman made turbine would be a snap. I think I remember reading somewhere here that there is something called Alumiweld? How strong is that stuff? Maybe that could be used. The generator is not the hard part, its the rotating part that actually catches the wind.

Offered by **Robert**.

Troubled Times

Focus the Wind

A turbine is just a bladed thing that turns when the wind blows. Most of the wind isn't really used. (I don't think) Analogy:

- When the sun hits a pile of leaves on a sunny day, the leaves get warm.
- When the sun hits a pile of leaves through a man-made lens, one leaf burns at the focal point. (the combined heat that is usualy dispersed amongst the whole pile of leaves is controlled and focused to a point)

I'm wondering how one might *focus* the various wind currents into a small point, increasing the air-pressure per square cm against a much smaller turbine. This would make more efficient use of the wind and the generator would turn with greater oomph. Imagine collecting all the surrounding wind currents and focusing them to a small, but powerful jet spray of air. Even slow breezes might be focusable to a usable amount. The structure might involve something like a very large, *stationary* box or cylinder, with inner structure designed to focus wind to the small generator in the center. The wind would be collected in such a way that it can come from any angle, but will get 'caught in the trap'. I still have no idea how to build one, but the idea seemed at least theoretically possible.

Offered by **Joe**.

Troubled Times

Funnel

Very theoretical. The wind acts like a wave front. The air molecules collectively move as a wave. The force behind this movement is difference in temperature and pressure in our atmosphere. Unfortunately, unlike light and sound, air is not easily gathered and focused. Light is known to bend as it passes through a piece of glass or crystal and this bending is controlled by different shapes in the glass or crystal. Sound is a vibration. This vibration moves along like a wave in that it spreads out with wave-like properties. Our ears "gather" this by collecting the vibration in air molecules and directing it into the ear canal.

The turbine idea is not so bad as long as the entrance was funnel shaped and the blades were aligned along all of the interior surface of the funnel. This would help in focusing air currents - by forcing them inward and together (think of the effect of connecting a small pipe to a large one--the water or gas that passes out of the smaller pipe is moving faster than when it entered the larger pipe).

Offered by **Roger**.

Yeah, I was thinking along the lines of funnels also. Your analogy of water pressure is probably better since it's more similar to air, then say, light or sound. I wonder if you could build a very large upright funnel, rather 'tornado-shaped', and place a small turbine horizontally in the narrow end of the funnel near the ground. I'm thinking that the air in the funnel will spin around very fast, or something.

Offered by **Joe**.

Troubled Times

Jet Engine

Focusing a flow of air from a low to high pressure area is the principle that a jet engine works on - and the ideas that you are talking about sound theorettically good - but there is a problem - when you focus a fluid such as air into a turbine-like device an impotant principal comes into effect - this principal states that when the pressure of a fluid flow is directly proportional to the speed.. So by incresing the pressure (turbine or funnel) you in effect increase the speed of the airflow. Therefore, the turbine blades must spin at a much higher speed to harness this energy. A jet engine does this, but unfortunatly, most spin at incredibly high speeds - tens of thousands of RPM's. It is just not feasable for a layman to build such a thing. Special bearings and blades are needed, not to mention the need to balance the rotating part so that it doesn't vibrate. Unless one is a mechanical engineer and has access to machine tools, I really dont think it is worthwile to try to build a wind turbine.

There *are* commercially available ones, but the cost is probably prohibitive - being that even the cheapest commercially available windmills are in the 1000$ range. A simple set of propeller blades can provide more than enough energy (10kW for example) to a simple generator to feed a single house or dome. The real problem is *speed* - you need to regulate the speed of a wind generator. (When a 200 mph hurricane comes the thing will tear itself apart!). I am thinking more along the lines of using an old airplane propeller that has adjustable blade pitch - its called feathering - when the wind speed increases you can tilt the blades to adjust the speed. This would be a good idea for a layman-built wind generator. An even smarter idea would be to try to spring for a $5000 generator built by professionals - they give out like 5-10kW, which is enough for a well pump and some grow lights. That is what I am figuring on. All I am really saying is that wind-generation is not as simple as it seems.

Offered by **Robert**.

Troubled Times

Into the Wind

Would you have to point it into the wind? I was thinking that pointing it upward and leaving it stationary would cause a circular current to form inside, kinda like a 'mold-your-own-tornado'. I know what your saying though, make the whole thing rotate like a big wind-sock. I don't think the big funnel will work at all. If you blow into a paper cone, most of the air blows back. If you blow sideways across it, nothing comes out the bottom. Blah. It would be a pain to build anyway I guess. However, Roger's idea of putting the funnel sideways made me think of wind-socks. Rather than a regular spinning generator, it might be possible to make a large wind-sock electrostatic generator. No spinning parts, just negative strips flapping in the wind in some controllable fashion, like that 'flapper' device I posted a link to a couple days ago. Of course it would be more complicated then that, and I don't know how rain or humidity effects those types of things. (not to mention that things like that can throw lethal sparks if they are large enough.) It would take a lot of doing & testing.

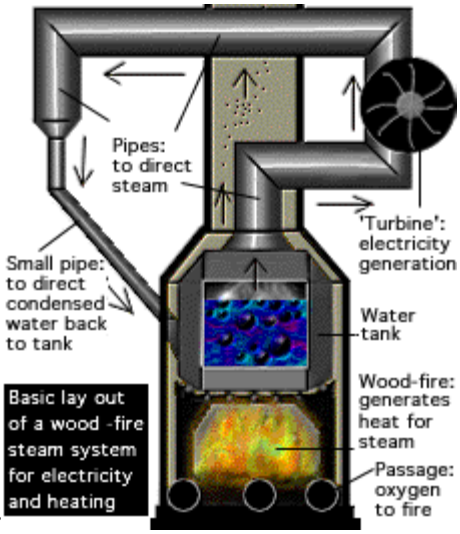
Offered by **Joe**.

Troubled Times

Wood Burning

I am interested in developing a design for a wood-fire steam turbine generator. Does the Steam Team have any helpful information of resources?

Inquiry by George.



Graphic by Michel.

Thanks for writing! Although most of us are not experts in the field of steam energy, we have put together a few things. You will also find that most of our ideas are based on the premise that supplies may be limited later on and that if a steam engine is built, it could be from whatever we can scrounge up. I don't think we have discussed much on turbines. Please, keep us informed and if you run across some good stuff, let us know. Maybe we could add it to our steam topic!

Offered by Clipper.

You might consider not using steam. Steam assumes that you need high levels of power immediately. However if you consider using the flow of the turbine to charge batteries then you don't have to worry about so great pressure and you can use a single where rather than many wheels to use of all the available energy from the steam.

So what you have developed is more like a hot water boiler, and an imitation river flow for a hydroelectric plant. If you can speed up the flow of the water substantially but not convert it to steam you will have a much more long lasting system without needing all the special high pressure protection , high temperature protections etc.

You can also use all the references for hydroelectric power, and you don't need to convert the wood to charcoal so you can develop enough BTUs. But to do this it runs on a long time basis, gradually charging batteries which are used as the primary source. You can also gang it with wind and sun, although we're all betting more on a long period of gloominess much like what happened to the Israelites during their 40 years wandering in the desert after the last shift.

Offered by Eric.

Troubled Times

Prototype

Welcome To
The Steam Engine Prototype Project
Written by Ron Darby

This prototype project came about quite by accident. I received an email requesting a wide range of information from a gentleman working on a home project to create his own power. During the course of our correspondence he mentioned something that sparked my interest. So here we are.

The information here is organized as follows:

Send mail to Ron with questions or comments about this web site.
Last modified: December 9, 1998

Troubled Times

Inexpensive

I'm excited about this project because I really think it can be done, the resulting designs are something that small communities and even individuals can readily implement, are very inexpensive, and have the ability to produce enough power to actually allow for growing enough vegetation indoors to feed a small community. The designs are also adaptable to vehicles, and heavy machinery such as bull dozers, excavators, cranes, forklifts, etc.

Ron

Troubled Times

Objectives

Objectives Of Steam Engine Prototype Project

- To develop a design for a Steam Engine and Steam Generation System that can, to the extent possable, be constructed from materials and with tools at hand, Post PS.
- To the extent that materials or devices must be stockpiled Pre PS:
-
    - Minimum number
    - Minimum cost
    - Minimum Cache size
- To design a system that has the following characteristics:
-
    - Provide enough power to drive an AC Generator large enough to artificially light enough hydroponically grown vegetation to provide for the requirements of a community of at least 30 individuals
    - Provide enough power to intermediately power machinery for building or producing other needed machinery
    - Be adaptable to heavy equipment such as bull dozer, crane, excavator, fork lift, tractor, etc.
    - Be self contained to the extent as to be able to provide cross country transportation
    - Be able to utilize fuel sources at hand
    - Be maintainable from available or self manufactured parts and material
    - Minimum complexity

Send mail to Ron with questions or comments about this web site.
Last modified: December 17, 1998

Troubled Times

Design 1

Steam Engine Design #1

Under Construction!

The principal idea is to be able to utilize existing internal combustion engines found in late model gasoline automobiles.

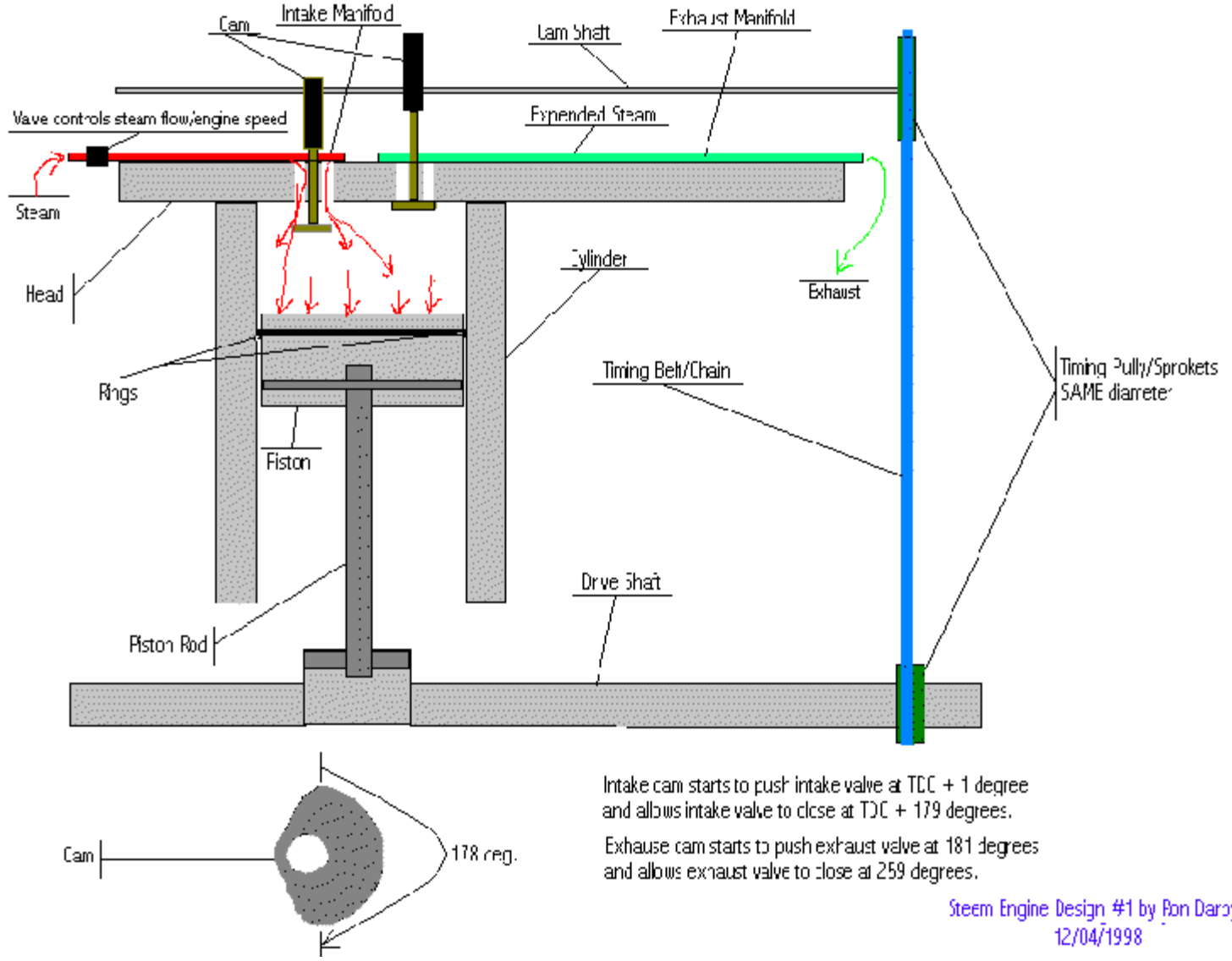
This page deals only with the Engine and assumes that a suitable steam source is available along with suitable fuel to produce the steam.

Design #1 proposes to utilize existing internal combustion engines, whether gasoline or diesel, as follows:

- Replace the carburetor with an adapter who's connection to the intake manifold is produced by creating a template using the carburetor/intake manifold interface. This adapter shall be at least 5/8" steel stock with a central orifice to which is welded a 3/4" female standard thread coupler which can connect to standard threaded black steal 3/4" pipe, which will provide steam to the intake manifold.
- Replace the camshaft and crankshaft coupling with a 1:1 coupling such that one revolution of the crankshaft produces one revolution of the camshaft(s).
- Modify the camshaft (or two camshafts in the case of a "V" configuration engine) as follows:
  - remove the existing camshaft lobes, preferably by grinding; or by beans of an oxygen/acetylene cutting torch and then grinding smooth, preferably by utilization of a metal lathe.
  - create new cams as follows:
    - utilizing at least 5/8" thick steel stock
    - layer one upon the other the number of stock pieces required
    - using a cam template dimensioned as shown in Figure 1a (note that specific dimensions will be dependent upon the particular engine being modified), shape the stock as prescribed by the template using a combination of oxygen/acetylene cutting torch and grinding; providing the prescribed opening just large enough to slide over the modified lobe-less cam shaft(s)
  - position the completed and polished cams as specified in Table 1a
  - attach the positioned cams by means of electric welding ensuring that nothing incidental to such welding interferes with any part that comes in contact with the cam surface or interferes with any oil port
- Replace the modified cam shafts and adjust the cam to valve interface using normal specifications for that particular engine.
- Throttle control shall be controlled by articulating a valve controlling steam flow into the intake manifold
- Discharge from the exhaust manifold shall be allowed to escape for the initial prototype and latter re-injected into the steam generation system once the engine design has been perfected

The conceptual design of this engine is depicted by Figure 1.

Figure 1
Engine Design #1



Send mail to Ron with questions or comments about this web site.
Last modified: December 9, 1998

The Hub

Troubled Times

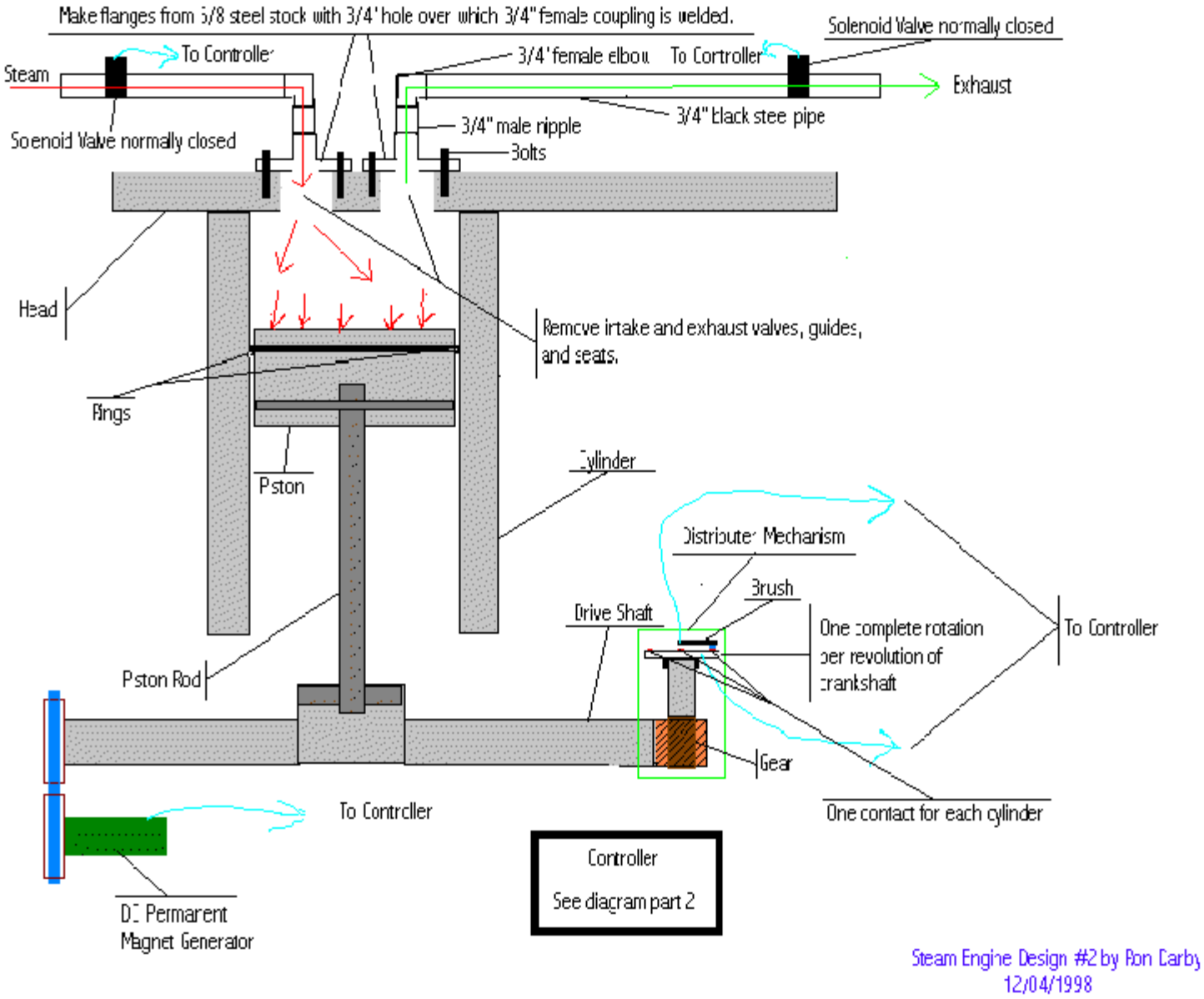
Design 2

Steam Engine Design #2

 Under Construction

This concept would be applied to each cylinder of the engine, with the Controller opening and closing the valves at the appropriate times.

- For an internal camshaft engine, remove the "push rods".
- For an overhead valve engine, remove each camshaft ("V" engine has 2) and rocker arms.
- Remove all valves and valve seats.
- Fabricate and attach flanges as depicted below for each valve opening.
- Leave the spark plug in place or in the case of a diesel engine, disable opening of the injector.
- Repeat the mechanical design below for each cylinder (except for Distributor and Controller).



Send mail to Ron with questions or comments about this web site.
Last modified: December 9, 1998

The Hub

Troubled Times

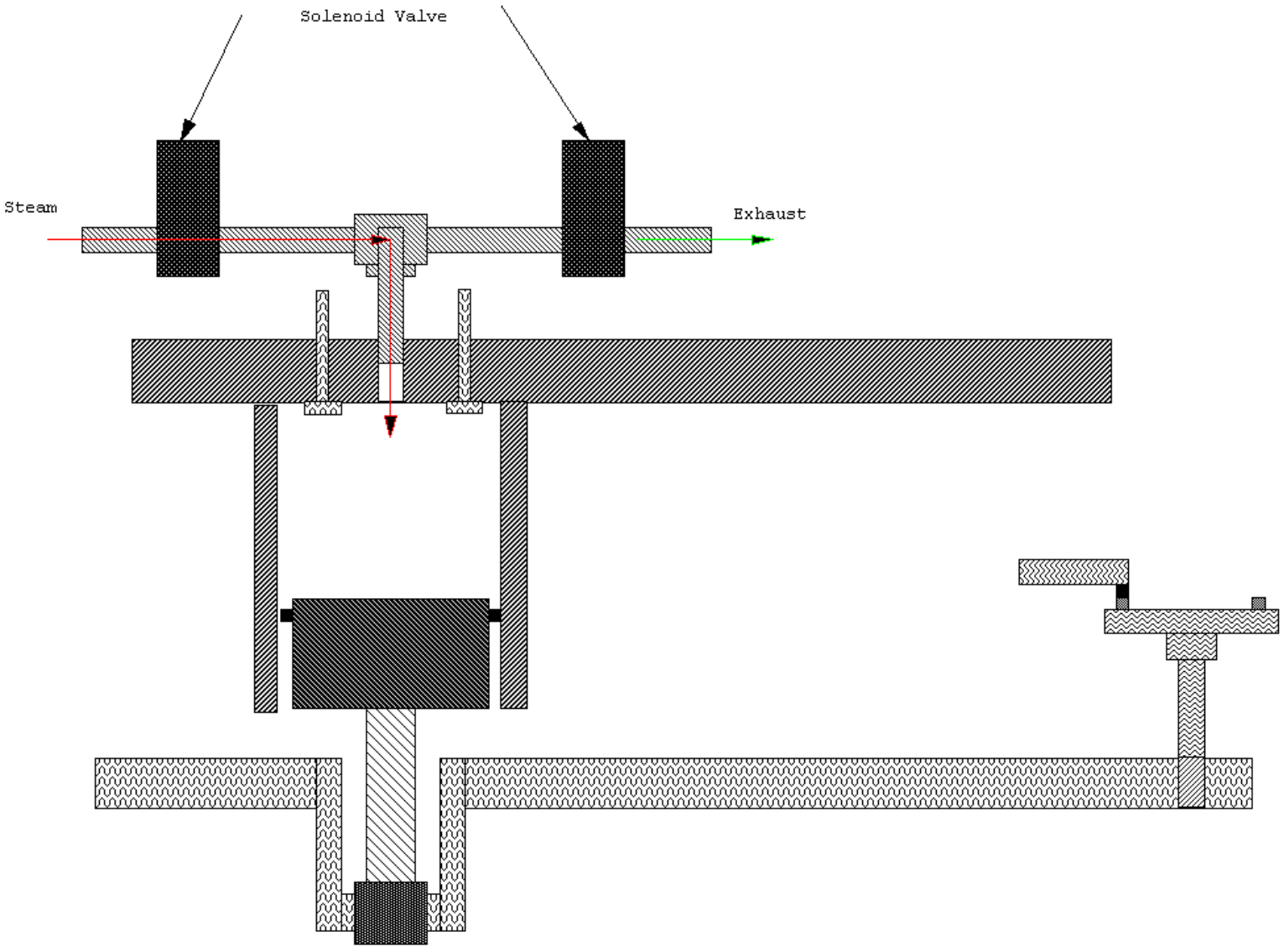
Design 3

Steam Engine Design #3

Under Construction!!

This is basically the same approach as design #2, but mechanically much more simple.

- For an internal camshaft engine, remove the "push rods".
- For an overhead valve engine, remove each camshaft ("V" engine has 2) and rocker arms.
- This leaves all engine valves permanently in the "closed" position.
- Using a metal drill, enlarge the spark plug holes and "tap" for 1/2 inch standard pipe threads.
- Repeat the mechanical design below for each cylinder (except for Distributor and Controller).



Send mail to Ron with questions or comments about this web site.

Last modified: 12/09/98

Troubled Times

Rust

Ron, steam condenses to water and can leak past the rings to get into the oil. Do you have a plan to minimize rust and wear from this? The area of "blow by" steam that gets by the rings and into the engine block does require design effort. Using normal motor oil, it wouldn't be very long before the condensed steam (water) would get emulsified in the oil and greatly impare it's ability to provide an "oil cushion" within all the bearings inside the block. Two solutions to this are planned for use simultaneously. First, the use of synthetic oil, which will not allow water to emulsify, but remain as whole "globs" of water. The second is to provide for an external oil/water seperator using gravity to "filter" the water from the oil. In an extream case, a "seterator" could be designed using either cyntrifical force, or more easy to build, one using heat to boil off the water as steam, allowing it to escape.

Mike

The only area of potential rust is the combustion chamber area, the area left when the head is at TDC (Top Dead Center). This includes the piston head. Research on "real" steam engines indicates that rust only comes into play in this area when it is left open to access by oxygen (air). Steam from the steam generator contains no free oxygen and so long as the system is left closed, there is very little chance for rust which requires oxygen. The cylinder itself is constantly coated by oil in the same way that a normal gasoline engine is - oil is "splached" into the cylinder area by all the movement within the block. Actually, gasoline engines have this same problem to some extent as the conbustion byproducts include a rather large amount of water, as you have probably noticed at some time. After starting a cold engine, you will frequently find a bit of water running out of the tail pipe - until it heats up enough so that the water escapes as steam along with the rest of the combustion byproducts.

Ron

Troubled Times

Piston Power

If I understand you correctly a standard unmodified 4 cycle engine would have about 1/4 the power and a 2 cycle would have 1/2 the power as a modified 1 cycle valve-train-engine, whether mechanical or electrical solenoids are used.

Mike

One cannot directly equate the "energy capacity" of steam to that of combustion. If we were talking about a 1 cycle gasoline engine this argument might be made; but steam is something entirely different. The potential power of one of these engines is not yet known. It depends primarily on two things. The amount of energy stored in the steam to be injected into the cylinder, and the amount of time necessary for this energy to be released inside the cylinder. A gasoline engine has a much smaller volume and stroke length than a standard piston steam engine, and normally runs at much higher RPM than conventional steam engines. All this acts against my design as far as power goes. At the moment, I am researching the mathematics of steam power so as to calculate what can be expected from this design and to indicate ways to optimize it.

For the reasons described above, and because of the difficulty in constructing the new cam shaft, I really don't have much hope for engine design #1. I am, however quite hopeful for the prospects of design #3, which is a simplification of design #2. Designs #2 and #3 utilize electric actuated valves built for steam use, the engine's existing distributor mechanism with some simple modifications, and a controller that's electronic; but great pains are being made to keep it simple and enable it to be constructed using electronic parts found in such things as TV circuit boards.

One other point. I currently consider steam power the only practical means of producing the energy requirements for a small community. Should the mathematics of my notion of using converted engines prove to make it impractical, I have joined 4 different listservs where collectors of working steam engines hang out. My reason is mostly to compile a database of where these real, working steam engines are located should a group need to find one post pole shift.

Ron

Troubled Times

Distilled Water

Is it possible to have a steam engine that could also distill water?

Fox

Well, yes, and no. You couldn't actually use the steam generated for driving the steam engine to condense and drink because it would have a certain amount of oil in it. You could, however, say wrap a number of copper tubing coils around the steam pipe comming out of the steam generator. The steam for the generator would have to be at a pressure of around 100 psi, meaning that it would be much hotter than the normal 212 deg F it takes to boil water. Therefore the water being run into these external coils would get heated above 212 deg F and turn to steam. When condensed, this steam would be pure. This is the way navel vesels for many years have produced drinking water while at sea.

Ron

Troubled Times

Diesel

Have you considered modifying a diesel engine? It has a higher compression ratio (longer stroke) and possibly other advantages. I am concerned about the amount of steam that can get through a modified spark plug hole may limit the power and speed. Also, there is inertia in the gas moving in the tubes. May need to design it so the on off steam valves are very close to the spark plug hole.

Mike

Yes, although I've concentrated on gasoline engines and in the rough drafts interchanged references to gasoline and diesel, I most definitely have been thinking of diesel. If given the choice, I would choose a large diesel every time over a gasoline engine for lots of reasons. As I talk to more steam experts I am learning that steam should be thought of like one would think of water. The mathematics that is the most applicable is hydraulic related. If you think of the steam generator as a water tank with a pump then you have a better idea of how steam will work. At first I was thinking of something like a half or 3/8th inch pipe for the sparkplug (or injector for diesel) hole. That would be analogous to running electrical current through a thin wire; that is, flow (of electricity or water or steam) is proportional to the diameter of the conductor, or pipe. The larger diameter the pipe, the more steam at a given pressure can flow through it. Now, I'm thinking that to get the most from any engine, I would shoot for about 3/4th inch.

Ron

Troubled Times

Success & Failure

- First 3 Months
- Lettuce Success
- Darn Those Mites!
- Plant Towers
- Containers
- Clipper's Tomatoes
- Second Wind

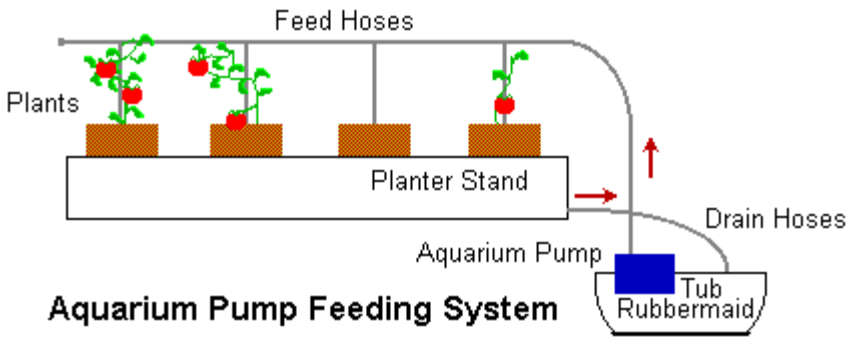
Troubled Times

PVC Pipe

I started working on fixing up the shed for Hydroponics today. Spent over five hours leveling it so far. I was doing some checking a few days ago about what might work good for the plant beds. I am trying to stay away from plywood and boards because of the plastic that will be needed, leaks and all that hub-bub. What I had in mind and still looking (for right price), ABS or plastic pipe about 20 or 24 inches in diameter. I want to cap both ends and saw the pipe in half length wise. You end up with two beds sealed on both ends that need no plastic and will never leak. When the PS gets near, bury them some how until it is over. When the time comes to start "farming" again, there should be no worries about what to use for the beds. So far, ABS pipe is over $8 a foot for 20 inch pipe. I'll get it yet. Working on possibilities of plastic culvert pipe like they put under drive ways. A little over $2 a foot.

Clipper

Try PVC pipe, very inexpensive and very flexible, easy to cut etc. That's the setup we have for tomatoes, beans, etc. Just make 3/4 of a rectangle (2 feet wide) on each end with a 4 foot long piece of PVC down the middle for support. This will support to 4 foot long deep trays and the corner joints will allow the tilting of the trays to allow for drainage.



Aquarium Pump Feeding System

John

Now, how will you cap the end that needs to drain? You need to flood the gravel or sand, then let it drain completely, once or more times a day. This means that the pipes coming out of the drain end need to have a stop in them, attached to the timer also ..

Nancy

Drain it into a Rubbermaid tub and have a small aquarium pump that pumps it back up through thin pieces of tubing back next to each plants - 4 plants per 4 foot tray, therefore 8 thin pieces coming out of one thick tube. This our setup. The pipes coming out of the drain end just go into a Rubbermaid container; you have a pump in the container; the pump sends the water back up on to the plants through a rubber hose (not garden ... thinner), and even smaller hose goes (thin plastic) goes to each plant ... there are examples in hydroponics books.

John

I am planning to use PVC fittings and valves on the lower end of the slanted bed.

Clipper

Troubled Times

Nutrients

Troubled Times

pH Balance

The pH balance is as important as the nutrients in the hydroponic solution. Where pH Testing needs to be done, during the summer of 1997 the best pH Meter to use is under debate. John found it highly important to Test pH Often, before adding chemicals.

Troubled Times

Alaska Hydroshed

Started in Summer 1997, the hydroshed is lighted with a Malibu Lighting system and the solution pumped by a Windshield pump and backup power by a Onan generator. Clipper plans to use Milk Cartons to raise the beds.

Offered by Clipper.

Troubled Times

Teeter Totter

Watering hydroponics beds by hand might be a necessity if survivors are without power or using scarse power for other needs. A Teeter Totter method would provide watering without lifting. However, since the plants would be wet half the time, Water Loving plants would be needed for this arrangement.

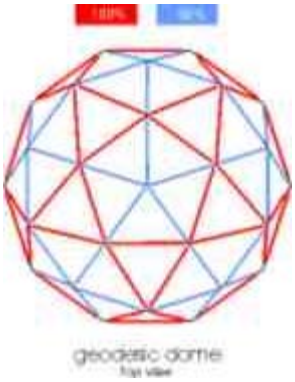
Troubled Times

Q&A

What is the biological clock of tomato plants so that we can induce the plant to flower?
Do you have to trim the lower branches of a tomato plant so that the plant will have more yield?
Can we use human excrement/urine for fertilizer in our hydroponics system?
Can we grow potatoes in a hydroponics system without soil?
Can we grow soy beans in a hydroponics system without soil?
How can we induce more flowering in a cucumber plant, to get more yield without fertilizer?

Troubled Times

Pipes



You can save a lot of trouble by stringing a dome framework together out of pipes, because you don't have to calculate or measure any angles. The framework resolves itself.

Click on the thumbnail above to see a diagram. You need 65 pipes, 30 of which are 88% the size of the rest. Then string them together as shown in the diagram. Start with the outside ring and work inward.

Once completed, slight pressure on the top should cause the base to spread out into a perfect circle. You could probably make large domes this way, then reinforce each vertex somehow once the structure is build. I've only made small models from straws, coffee stirrers, fishing line, twine, etc.

But with some metal poles and strong rope/cabling, you could build a pretty cool house that even El Nino's bitch ass can't blow over! Just build the framework, reinforce the corners with duct tape or more rope, wrap industrial plastic wrap around the whole thing, then dump on the concrete baby!

If you make a framework large enough to stand in, you'll be able to hang onto the center of the ceiling without bending the dome! (provided you tied enough knots) Pretty good results for no nails, screws, or glue.

Most people's houses are square. Squares blow over, even brick houses have blown over in high winds recently. Domes don't blow over! Build one, or at least save up the parts in advance so you can build one in a hurry if you need to. Why live in a house built like one from the 1700's?

Offered by **Joe**.

Troubled Times

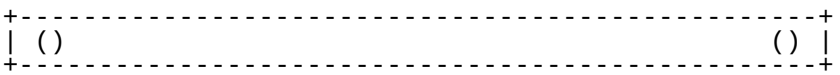
Stringing

In all the mail concerning tube & rope domes, I have not seen any mention of the path the string takes through all the tubes. There must be an optimum path to minimize the amount of rope used. Those of you who have done one have any thoughts on the matter? Do you try to use one continuous piece to minimize the weakness that knots inevitably introduce (not to mention the hassle of tying lots of knots) or use a series of pieces tied a strategic points?

Offered by **Scott.**

Weakness is rather irrelevant, because once the framework is constructed you'll have to cover it with some hard material like concrete. I had "descreet construction" in mind, where I can "sneak" a very small amount of building material to any location and have a dome up that day. Start with the outside, and work in. Most of the dome can be made from "rings". So start with 10 long pipes on the outside, and ring them together with a simple slipknot, then tie another knot (square knot). Make it snug, but not excessively so. Add more layers using rings as much as possible.

Occasionally, you may have to put 2 strings through 1 pipe. So make sure your pipes are thick enough (or rope thin enough) to accomodate this. I've never had to put 3 strings through 1 pipe, however. And really thick rope probably isn't necessary unless building a real huge dome. When it's done, it might not seem that great until to apply downward pressure to top of the dome. It will press against the ground and the whole thing will even out nicely. Another idea is to skip the pipes, and use flat strips of metal with holes drilled in each end. Like:



Then you could bolt the thing together and bend it around if you need to. If I can find some small metal strips I may try a model of this. Pipes & strings requires a lot less work, though. Putting all of the pipes on one single string might cause trouble. I think you'd still have to tie knots at almost every corner anyway. So in the "hassle" of having to tie a lot of knots, you're still building a dome rather quickly, and with pretty bare materials. I think you can pretty much tie it together any way you want, do like you said and try to minimize. Hope that helps.

Offered by **Joe**.

Troubled Times

Hot House

I want to build a geodesic in my backyard (for practice) and use it as a greenhouse (you know, cover it with plastic). I thought that it would be a good test of stability (since it is quite windy where I live) and I could experiment with covering it with shading material to control light (to test low light growing conditions).

It may not be a good idea, but I want to build the thing out of wood (easily available and lighter than metal bars). I would use screw-type tie-downs to keep it from blowing away. Could you suggest lengths necessary to make it about 10 feet tall and roughly 15 feet in diameter?

Thanks, **Roger**

You can figure the sizes you need from the radius. Take your 15-foot dome:
radius = 7.5
radius * PI * 2 = circumference
which is 47.123
the geodesic base has 10 of the long segments, so your long segments will be
47.123 / 10 = 4.712
the short ones are
4.7 * 0.88 = 4.146
Use the metric system instead and you'll make your life a lot easier.

Another idea besides wood is electrical conduit. It's cheap and you can flatten each end, and drill holes. Then you can bolt the whole thing together, bending the tabs as needed. For a small dome even smaller pipes could be used, don't know where to get 'em though. Hope that helps some.

Joe.

Troubled Times

Reflective Material

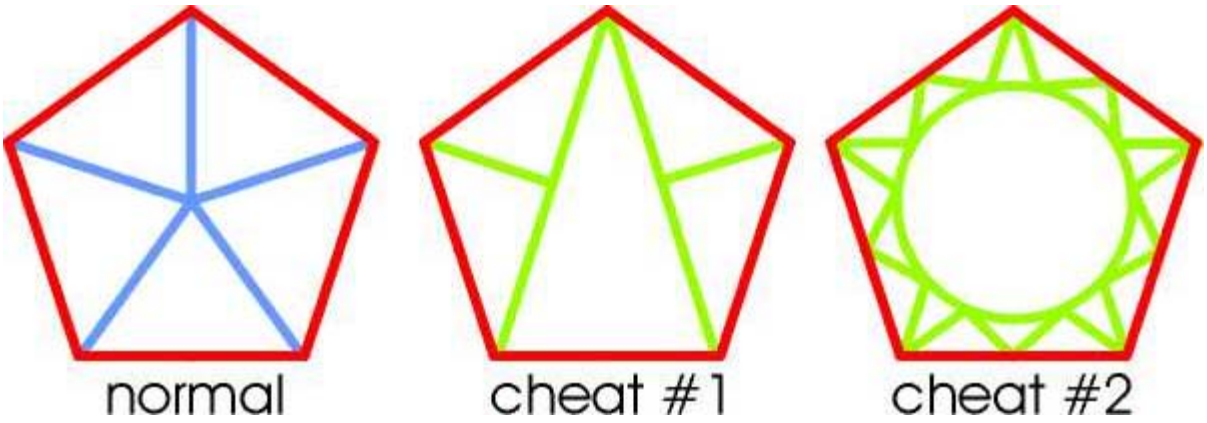
I am working on a dome using Joe's design and intend to cover it with plastic and use it for a greenhouse (for the time being). This morning a thought occurred to me - if I cover the interior with a reflective material could I use a minimal light source and provide enough light for the plants inside? My next idea was to design a circular garden, cover it with a dome (with a reflective interior) and light it with one light placed in the vertex. Possible?

Roger

I think that would be much better than a square building with reflective covering on the inside. All the light would be reflected back towards the center and the ground by shape alone. The dome is more energy efficient than a square so it will hold the heat better. A whole lot less wasted space. I think even the air would circulate better inside a dome with no sharp corners. That, and it sure would impress the neighbors.

Clipper

Ok, I have an idea. I don't know if it works or not. Find a pentagon shape on the side. Normally that shape has 5 poles within it, converging to the center. You can cheat and make it look like one of these:



Then you'll have a taller door large enough to duck into, or a circle large enough to duck into. I would prefer a circle, but for a greenhouse the tall triangle should suffice I think. For a real dome to live in, the circle would be much better I think. Then you could make a circular "cap" with a seal. Hope this helps.

Joe

Troubled Times

Plywood

---

3 years ago my brother and a friend of his and myself built an 8 ft. dome of conduit and plywood in my back yard. It's still there and in good order today, in fact it's where I park my bicycle. The project was intended as an experiment in alternative living, low impact, renewable energy, etc. We never completed the project, money, time, personal commitments etc.. intervened. The friend occupied the structure for one winter while between apartments. It was unfinished, dirt floor absolutely no interior finishing and with a tarp for a roof the first month of his stay. We did put a roof on it and about a year and half later I put in a floor, (joist and plywood, not the cement one we had intended). And now it is a very serviceable storage shed and bicycle garage.

It is a 2 frequency triacon alternate breakdown of 8ft diameter. Built of 3/4 in. conduit bolted at the hubs and covered with 1/4in exterior plywood. Plywood was cut into triangles to fit and attached with conduit clamps, (those little omega shaped clamps that hold conduit to walls, or in this case hold the walls to the conduit). Joints between the plywood panels were taped and the whole shebang painted with an epoxy roofing compound. The roof consists of a pentagon "gable" that sits atop the top conduit pentagon. The gable is topped with that corrugated translucent green house covering and the sides of the gable are hinged and glazed windows.

The door is similar to Joe's idea. Since I'm no artist I'll refer to his drawing for the Hothouse. Looking at the pentagon take the top center tube and bend it straight up and out. Take the two side arms of the star, and likewise bend them straight up and out. This makes a king of dormer that becomes the top the door frame. The two legs of the star are removed completely and a door frame is roughed in. Paneling the door area is more difficult because the panels have to be custom cut.

Some details.

- To address Rogers question about light, even with just a 75 watt light bulb reflecting from unfinished plywood ample light was obtained. The illumination is very even without shadows. If the walls where better reflectors it would be uncomfortable to remain in it with a bright light.
- It is equally good at reflecting sound it is almost easier to hear someone standing near a wall opposite you than someone standing in the middle, (there can be no secrets kept in a dome).
- Air circulation is truly incredible with the chimney effect of the gable windows.
- We never insulated the dome, and the shell is just plywood and epoxy paint so it really follows the outside temp. While Leo used it that one winter he heated with an kerosene heater. It didn't work very well. Domes have a favorable surface to volume ratio, its a lot of volume to heat and without insulation that dome shape makes for a wonderful radiator. The friend couldn't keep it warm.

Travis

Troubled Times

CAD Models

Is there anyone who has built or is going to build a geodesic dome for residence during the times ahead? I'm planning to set up a dome for myself, friends and family. Wondered if anyone has tools, software, books etc. to help me out of the difficult mathematics of the dome. Or maybe CAD-drawings of domes in .dxf or .dwg format.

Erik

Troubled Times

Geometric Dome

Joe explains his early struggles with a Quadrangle design, the Plan, the Discussion, the Model, the Results, and the Prolog, and his final Conclusions.

Troubled Times

Dirt Mound

Ron describes a Dirt Mound construction technique, meets Expense concerns, is Inexpensive and generated a lot of enthusiasm as it is a Viable Idea.

Troubled Times

Step-by-Step

This anonymous contribution is a step-by-step description of how to build a concrete dome!

Troubled Times

Punt

I was watching Jeopardy tonight, and there was a question about the indentation on the bottom of wine bottles. The indentation is called a punt, and it strengthens the bottle. This got me thinking, if there was a similar indentation on the bottom of a dome, perhaps it would add structural stability to it, stability that could perhaps help the dome survive a pole shift.

Offered by **Mike**.

This could have some merit. If you think about what it would look like on the bottom of the dome with a punt in it, as a quake was rising to push it up, it would push more on the edges transferring the pressure around the dome and not through the floor. This could also be better for the wind storms as the dome would dig in around the edges and not just slide on a flat surface. The floor would have to be thicker around the edges to create the punt and still have a flat floor. That would be okay also because the floor would have more weight to hold the dome down. I think the advantages would justify the added cost. Other wise you would have a big lump in the floor like the inside of a bottle. You could spill your beer with a floor like that. Very good observation mike.

Offered by **Clipper**.

Troubled Times

Donut Shape

I've been working on better ideas than domes. It seems that domes are a pain, and that a torus-shaped (donut shaped) or half-torus shape would be much easier to construct and at higher strength.

Troubled Times

Testimonials

My experience with this solution has been very good. I have used it in my house to cure colds, ear infections, cuts and scrapes. For viral or bacterial infections, I give 3 teaspoons a day and it clears up in about 3 to 4 days. Ear infections I put the solution in the ear about 3 times and it clears up in about a day or two depending how soon I catch it. This is for both adults and children. I take about 1 teaspoon a day as a general tonic and when someone is sick or there is epidemic going around I up it to about 2-3 times a day till it passes. From what I have read, the silver is excreted from the body in about 3 weeks.

Pat

About 4.5 months ago I added colloidal silver to my routine taking it in an ever increasing gradient amounts. I am currently taking about 1 oz/day of 150 PPM (estimated) CS. This is equivalent to 10 oz/day of 15 PPM. My body weight is 175 lb. I am working on clearing the body primarily of Candida yeast. Something I have had since my early teen years and has invaded all parts of the body. Candida is very tenacious and fights back with some strong cleansing reactions if one jumps the gradient too fast. I have been through about 3 levels of cleansing reaction. I hold the dosage until flat on reactions then I will go up a little more. Sometimes I even have gone down on the dosage for a little while. I will let you know what dosage I finally work it up to. I expect this process to last another 6 months to a year.

Mike

Last time I made CS, I forgot about it for three days before I remembered I was making it. The glass on the inside is a mirror color. This is a *very* potent batch I would guess. The last time I felt myself getting a sore throat, I squirted two shots (I use a spray bottle) into the back of my throat, swished it around and swallowed. The sore throat disappeared almost immediately.

Clipper

Troubled Times

Michel's Travails

To those who have experience in making CS themselves I want to ask if it's normal that the silver electrodes discard a fine mist with a golden-brownish color? Within the first seconds the mist began in my self-distilled water and now, after 15 minutes and after cleaning the electrodes and putting them in again I notice the water turning dark-brown-blackish color. Is this okay? I don't trust it. Could the voltage be too high? The water is distilled and at hot temperature with a drop of honey added. The silver also stains the sides of the glass where it touches it a bit of brown-blackish kind of residue or something.

Michel

Troubled Times

Pat's Answer

Okay, Michel, let's take it from the top. You are using 3 9volt batteries, correct? Okay. Now, leave off the honey for now until you get the hang of what the finish product actually looks like without any additives. It sounds like your silver electrodes may be bigger then the 14-gauge size wire. The actual time needed to make it averages between 5 and 15 minutes with warm water. The hotter the water, the faster the process. Yes, you will see a fine mist leaving one wire and tiny bubbles from the other. There is a build-up of black residue after awhile. To avoid this build-up switch the alligator clips to reverse the polarity when it starts to show up. This will keep the residue from building up into a heavy layer.

Stop the process before the water gets dark and murky. I let my solution sit overnight for any particles to settle on the bottom. I always seem to have a bit of residue during the process, but it does not affect the solution. By the next day the solution is no longer cloudy and has a nice light golden color. Sometimes the color is very, very light, depending on how long you do the process. I siphon my solution gently with a straw as to not disturb the sediment on the bottom. I use 8oz of water per process. I use a tall clear glass to do it in. I put the solution in small amber bottles that protect the solution from direct light.

I hope this helps. Practice makes perfect. It took me several batches before I got the hang of it and recognized what worked and what didn't.

Pat

Troubled Times

Mike's Answer

The longer you let it go the darker the solution. I have made some real black looking solutions. It doesn't hurt a thing. It makes a high parts per million solution. Use a coffee filter or several thickness of paper towels over a strainer. Pore the black solution with the particles of black silver oxide floating around through this filter. The result will look almost clear.

The golden-yellow will show up over the next few days. Keep it in a dark place or dark bottle. The longer you let it set the better (finer particles) it gets. Your voltage is not too high. I use 5 to 6 times what you used. Don't worry about the color - this is normal. I make it without honey.

Mike

Troubled Times

Tian's Travails

I am still new in this group, and I have some dumb questions to ask everybody who is involved in this Colloidal Silver.

1. During the production of CS,is it wise to put an alcohol burner underneath the glass jar? (just to keep the temperature constant)
2. Is it necessary to put a lid on top of the jar, during this process?
3. Is it necessary to keep the voltage and amperage steady at 30V, 50 amps? (I have no problem building a power supply with a constant voltage and with a limiting current)
4. One last question,will CS work against viral diseases, such as MS or AIDS? (I understand that regular antibiotics will not/can not destroy virus)

Tian

Troubled Times

Various Answers

Answer to 1. No, I do not find it necessary to keep the water heated. I make mine in 8 oz. batches with my homemade generator. I first zap my distilled water in the microwave until it's hot, not boiling. Hot water starts the process quicker, it only takes about 15 to 20 minutes for the solution to form. You can also do it with room temperature water, it takes about 30 to 45 minutes. Mind you, my silver wire is a smaller gauge (18 was all I could get my hands on at the time). 14 gauge is a better size so timing will be a little faster, more surface space for the silver to react to the current.

Answer to 2. I don't find it necessary to put a lid on for the purpose of processing the solution, but I do use a lid that holds my two silver wires attached with electrodes suspended over my glass for the process. It basically just sits on top of the glass. It's not sealed.

Pat

How It Works

> *The presence of colloidal silver near a virus, fungus, bacterium or any other single celled pathogen disables its oxygen metabolism enzyme, its chemical lung, so to say. Within a few minutes, the pathogen suffocates and dies, and is cleared out of the body by the immune, lymphatic and elimination systems. Unlike pharmaceutical antibiotics which destroy beneficial enzymes, colloidal silver leaves these tissue-cell enzymes intact, as they are radically different from the enzymes of primitive single-celled life. Thus colloidal silver is absolutely safe for humans, reptiles, plants and all multi-celled living matter.*

I don't think temperature has anything to do with making CS. I put a lid on our jar only because we smoke in the house. I think it also keeps the dust out. I use three 9 volt transistor batteries run in series to power my generator. Seems to work fine.

Clipper

I make it by rectifying 120 V AC. Gives me 170 V DC to about 130 V DC by the time I stop the process. I use a simple circuit of 100 Watt light bulb in series with a diode. The 100 watt light bulb limits the current draw in case the electrodes short out. I use an electrolitic capacitor in parallel with the electrodes to help stabilize the flow. I use .75 sq. in surface area of electrode and produce 1 gallon of 100+ PPM in less than 3 hour. No heat applied. I found the optimum electrode spacing to be .2" for this voltage. Note: The above approach should only be used by those who are extremely cautious around electronics. The voltage and amperage is high enough to be dangerous.

There is reports of it working for viral disease in the laboratory at high PPM (Parts Per Million). The question is can one take enough into the body to make an effect. I personally think the answer is yes, however, there are some other things one might consider having around to use at the same time. Garlic 1-3 cloves 3 times/day is anti-viral and antibacterial. One doctor reports the Russians have used it in preference to penicillin. Echinacea stimulates and builds the immune system.

Mike


The
Hub

Troubled Times

Aron's Travails

Ive got the batteries, I’ve got the water, I’ve got the modle type writen down so i can get the same solar cell. My laser pointer has a max output of 4mW@630-660 nm. Is this the same strength as yours? I assume all red comsumer laser diodes are pretty standard? I got some silver wire. Its pretty thick. Does this sound like the right stuff. The package says Stearling Silver Garanteed? Is there a way I can tell, maybe by the reaction in the water? How might one test this?

Aron

Troubled Times

Wire Answers

You cannot use Sterling Silver, it must be Pure Silver at 99.9 percent or higher. Who did you get this from and what does the package mean by Stearling[sic] Silver Garanteed? Who ever sells you silver must specify the grade and size because it is sold by the troy ounce. There has to be some kind of documentation with the purchase that states the purity and the market value plus markup price. It should also give the weight. If you don't have any of this documentation take your receipt and take back the silver because there is no proof if it is pure or sterling. Your confusion on the packaging stating "Stearling" [sic] leaves me to wonder if that is the name of the seller or they misprinted sterling as the product.

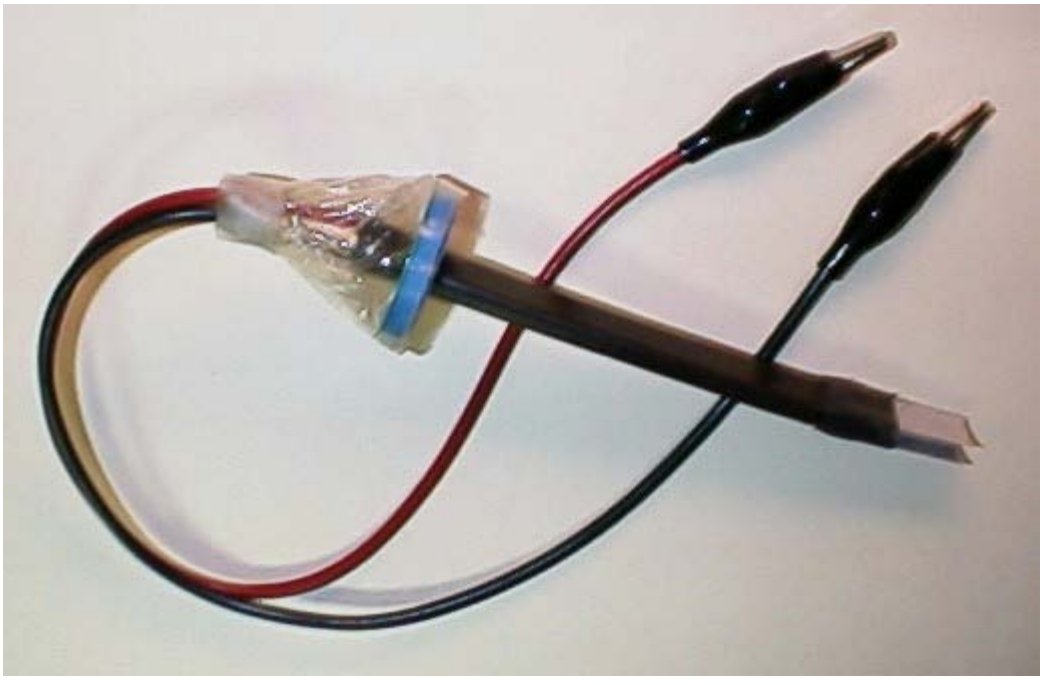
Pat

Sterling silver is *not* what you want. It contains stuff like nickel (i think). It is *not* pure silver. Pure silver is 99.9% silver and should say so. Don't let that jewelry store pull your leg.

Clipper

I would not recommend using this. Get .999 fine or 99.9% pure silver. Sterling silver has only about 92% silver and it is the other things in the 8% that could be harmful. I get Silver Electrodes for colloidal silver making from:

RioGrande tools & equipment
7500 Bluewater Road NW
Albuquerque, NM 87121-1962
telephone 1-800-545-6566 (USA)
1-800-253-9738 (Canada)
1-505-839-3011 (other countries)



Silver anodes

Order number 101-928 this is .999 fine silver with a weight of.45 Troy oz for each 1"x 6" by 28 gauge thickness - cost is about 1.83 times current silver price. Each electrode cost $3.74 in Jun 97 the last time I bought some. It is what I currently use and like the best. One strip cut in half makes two electrodes. I insulate all but the last .75 inch with heat shrinkable tubing. Once this end is eaten away I cut back on the insulation. I estimate the full .45 oz of silver to make about 40-50 gallons of Colloidal sliver of the 100+ PPM type.

One can also get 18 gauge .999 fine silver at about $.86/foot (Jun 97) and 4 gauge sterling 92.5% silver (not recommended) at $7.74/foot (Jun 97) at roughly about the same factor above current silver price. My current understanding is the .999 fine is usually only available in small size of wire. The larger wires are more commonly Sterling silver. This is why I use strips or sheet material. If you go into your local jewelry manufacturing supply company ask for "Silver anodes" used for plating silver. Then check that they are .999 fine silver with a weight of.45 Troy oz (1"x 6" by 28 gauge thickness). All of it is sold by the ounce. I order as a hobbyist. Pure silver strips are also available from:

Academy Metals and Supply
3201 4th St. NW
Albuquerque, NM 87107
(505) 344-8323.

Mike

Troubled Times

Laser Answers

See the TEAM pages called PPM and Optimum Settings for more information. My laser is 5mW@630-680 nm. Note: Any laser will work. We are going to build a calibration curve for this laser against a standard (sample we send for testing PPM). By the way Harbor Freight Tools has them on sale for $12.97 until 5 Oct. 98. They go on sale 2-3 times/year. Regular price is $19.99 for this HI output laser pointer. Lot number is 37431. This is in case anyone else wants to build one of these CS testers.

Mike

Troubled Times

Not Sophisticated

I sit here with my little plastic box holding my 3 9 volt batteries with my attached alligator clips holding my two 10" long 18 gauge silver wires one inch apart from each other in a tall 16 oz. clear glass holding 8 oz. of distilled water warmed up 90 seconds in my microwave oven watching the little bubbles coming from one wire and wispy golden "smoke" wafting from the other wire. As I watch for about 15 minutes, the build up of oxide becomes apparent on one wire and I switch the clips. The build up fades away on that wire and after 15 minutes starts to build up on the other. So I sit there going back and forth, back and forth for about 45 minutes. Why 45 minutes, well because my wire is thin. Could not afford the 14 gauge, but it still works just takes a little longer. In the end I get a light smoky yellow solution with a little of the oxide sitting at the bottom. I let it sit overnight and the next day it is a clear light gold color. I have no way of knowing how many PPM that this solution holds. Based on everything I have read, I would estimate about 15 to 20 PPM.

There are probably a lot of people like me whose only access to something like this will be to make their own little box without the fancy gadgetry that others have and who's understanding of the mechanics is going to pretty basic as far as watching and experimenting with the process.

Pat

Troubled Times

Step by Step

There is more to this than just the passage I have here, from an article by Peter lindemann. Please, if you are making your own colloidal silver you must read this article to get a better view on the process and reasons behind it.

Pat

The very best voltage for the reaction is 30 volts, because the electrodes run the cleanest at this voltage. If you have a small power supply, set it for 30 volts. If you are running on batteries, it is best to start at 36 volts (three 12 volt batteries or four 9 volt batteries) and let the batteries drain down from there. Holding the silver electrodes at a uniform distance away from each other yields a better product. When 30 volts is applied across silver electrodes held uniformly apart in distilled water, a totally different event happens. First, the reaction proceeds very slowly. Often, for the first 15 minutes nothing seems to be happening. Then finally, a faint yellow mist will begin to form. Within a few minutes, the reaction will speed up, but the particles produced will be a golden- yellow as viewed with a flashlight.

Using this method, 8 ounces of distilled water at room temperature can be made into a 3-5 ppm colloidal silver preparation in 20-25 minutes. Made this way, colloidal silver can cost under 10 cents/oz to make. Electron microscope photographs of this product show a silver particle size in the range .001 to .004 microns. During manufacturing, the particle cloud is a golden-yellow. These particles will hang in the water at the level they are produced, and for the most part, will not fall to the bottom of the glass. This is what a "colloidal" preparation of silver looks like. After the particles disperse, the water will look clear again, but may turn a light yellow if the concentration is high enough and after the particles have become evenly dispersed.

Troubled Times

Mike's Concerns

Don't believe everything you read. Some things get propagated and said often enough that they get general agreement. Does that make them true? With all due respect "The very best voltage for the reaction is 30 volts" I consider to be a common misconception that needs further explanation. Without an indication of distance between electrodes and temperature of solution this statement is useless. I can take 12 volts with close electrode spacing and get lots of dirty electrodes.

The point is the author doesn't take into account that the field gradient between the electrodes is determined by the distance between them and that this is more important than voltage. The shorter the distance between electrodes the higher the electric field and the electrodes get so called dirty faster. But, also the silver is put into solution proportionally faster. At higher temperature solution the electrodes get dirty faster. Did this author compare how long the solution lasts versus field gradient? I suspect not. I did some testing early on and I found that a low field gradient produced with low voltage and wide electrode spacing results in a colloidal solution where the silver falls out of solution faster. Each particle has less charge.

Mike

Troubled Times

Voltage

Now in defense of the 30 volt process: It is near idiot proof. Can't get shocked. With no agitation and wide spacing on the electrodes you can walk away from the process. You just don't get as good a colloid as I think you can. By the way the spacing would need to be .037" at 30 Volts to be about the same field gradient as the above. Way too close for good water flow, especially if flat plates are used. I have some solution I made with the above 170-140 medium voltage approach made almost 3 years ago that I estimate to be at present about 125 PPM. This has been stored in a plastic bottle all this time.

Plastic bottle misconception: Over time I have found plastic to work just as well as glass. You need to allow about 6 months to a year to get it seasoned or coated with silver on the inside before it really starts working well. Note: I was making silver back before all the fixed ideas came to be published and I had to do my own observation analysis and development of the process. Thus, I don't think alike nor believe all I read on this subject.

Is all of this the final word? Definitely not. I hope others who have the time will improve on this and tell about it.

Mike

Troubled Times

PPM Dosage

To get the body up to a point of having a concentration of 3 to 5 PPM would take some assumptions and calculations. If you get above this concentration the killing power starts to go down. This should not be saying to take only 3 to 5 PPM colloidal silver.

If one assumes that it takes 7 to 20 days to arrive at a saturation point for any given dosage. That is to say at a saturation point the amount taken into the body on one day is the same as the amount filtered out of the body during that day. Taking the best case of 20 days one would need to take in each day 1/20 there body weight of 3 to 5 PPM colloidal silver. If one weights 200 lbs., this would be 200lb*1/20 = 10 lb. of colloidal silver at 3 to 5 PPM taken in each day to saturate the body up to 3 to 5 PPM. Now if one took in 50 PPM colloidal silver then one only need take in 1 lb./day. If this is 200 PPM colloidal silver then one only need take 1/4 lb. or 4 oz/day.

Now what saturation PPM in the body can we expect from taking 3 teaspoons (.5 oz) of 10 PPM colloidal silver/day? This would be equivalent to 1 oz of 5 PPM/day. 1 oz times 20 is a 20 oz body at 5 PPM saturation. But we have a 200lb body so we can expect a (20oz/((16oz/lb.)*200lb))*5PPM = .03PPM saturation. Is this enough to do the job? The point is it looks like it is not that easy to get to a point of having 5 PPM in the body. If any one has better data on this subject or the original assumption - on how long it takes to get to a saturation level - please publish it. If the time is less than 20 days then the amount taken in needs to be even more.

Mike

Troubled Times

Optimum Settings

I found the following to be the best or most optimum temperature electrode spacing, voltage, wave form, frequency, amperage, and electrode surface area:

Temperature: 70 degree F
electrode spacing: .2 inches
Voltage: 160 V DC
Frequency: 2 sec/cycle
(this can be simulated by interchanging the voltage on the electrodes every so often)
Wave form: square wave
Available current: 1 amp
electrode total surface area: .75/2 sq. in.

Observed effects:

- Voltage too high (Above 300 Volts) then the unit becomes dangerous and can't easily supply the current or amperage to keep the voltage up to where it needs to be to use any decent sized of silver electrode surface area. This is the problem I found with the high voltage units I borrowed, tested, and at first built. I had one commercial unit that supposedly used 30,000 volts. I measured 20 volts when it was in operation.

- Voltage two low (below 80 volts) and electrodes need to be too close for good water flow or the process is slow and inefficient.

- Low electric field gradient (electrodes too far apart) produces a low charge on the colloidal silver particle and it tends to drop out of solution sooner than it should. With wide electrode spacing the process takes so long that you pull as much silver out of solution as you put in, thus hard to get a high PPM. Gives a more metallic taste the lower the voltage used. The high voltage result doesn't have this taste as much. I observed the silver produced with low electric field gradients to produce more waste or black particles for every ounce of a given PPM colloid. This is probably because it took much longer to make.

- High electric field gradient (electrodes too close results in bridges of black silver oxide forming across the electrodes that shorts out the process. In other words it is hard to keep the flow of water between the electrodes. Needs constant agitation of the water between the electrodes. There is a possibility of the silver particle size to become larger as the electrodes get closer. However, I never found this to be true no matter how close the electrodes got.

- Available current needs to be enough to keep the voltage up during the full span of the process. If voltage drops too much then one gets into the low voltage effects. The needed amperage is related to the size of the electrodes. The more surface area the more amperage is needed to maintain the voltage once the solution gets a little silver in solution and becomes conductive.

- Agitating to keep the electrodes from shorting (due to bridges of black silver oxide forming) is necessary to use this medium voltage approach. Without agitation you can waist some silver.

I use the following general guide lines:

1.5 Min/oz will give a golden-yellow estimated to be well over **100 PPM**
(voltage gets down to about 140 volts)

2.3 Min/oz will give a darker golden-yellow estimated to be well over **300 PPM**
(voltage gets to a point the light bulb is glowing and pulsing constantly)

Mike

Troubled Times

Measuring PPM

Current Situation:

Reliable ways of measuring CS PPM do not exist today. We need a cheap way to do this. I have checked out a hand held meter used for determining the PPM of minerals, and salts in water used by the water filter industry. Results did not work well enough to use. Readings were way too low. The visual method of passing a laser through the solution and estimating the PPM is subject to too much judgment error. This method is useful to give overall ball park estimate to the trained eye in a pinch. However, if we are seriously going to use Colloidal silver then we need to know how strong a batch we have just made. Then, adjust our dosage amounts accordingly.

Proposed solution:

Hand held battery operated laser pointers are cheap today. I have seen them between $10-20. If one shines this laser through a glass or plastic container of some width say 4" or more wide. With Colloidal particles stopping and/or reflecting the light in all directions, one will notice that the amount of light coming out the other side is roughly inversely proportional to the amount of silver in solution. The more the silver the less amount of light gets through.

Now put a cheap photo-voltaic cell (say from radio shack) on the opposite side to measure the amount of light. The photo-voltaic cell is then hooked to a cheap current meter (or multi-meter if that is what you have). Vole - we have a setup that quantitatively measures amount of silver in solution. This unit will need calibration. This can be done by sending off 1-3 or more samples of silver ranging in density from high to low to one of the recognized testing labs. A graph plot of current ver PPM can be drawn. In this way the reading of the meter can be mapped to a more accurate PPM estimate. One reads the meter looks it up on the graph and reads off the PPM.

Now the most costly part of all this is the testing lab fees. If we individually all do this we will have spent a fortune. I recommend that one or more of our list members that sells CS or knows electronics volunteer for the development/refinement of this colloidal silver PPM meter. Post the results of how to build it. Sell the result to those who wish to get a fully calibrated unit and don't have the time or expertise to build it. If one decides to commercialize this unit. I recommend supplying one or more stable test solutions (not CS) that attenuate the light the same as some given PPM of colloidal silver. This would be used to check the calibration on into the future. This could also be sold separately or with the unit.

The commercialized unit that I currently visualize would enclose the sample in the dark once a lid is closed. I am mocking up a clear plastic tray about 4"-6" wide that is 1/4" to 1/2" deep (from front to back) and maybe 1" high that only needs to be filled 1/2 way up with colloidal solution. The beam comes in from the right end and the photo-voltaic sensor is on the left with the meter in front. The unit is in operation once the existing button on the laser pointer is pushed. If the calibration holds well over time then the commercial version could have a PPM scale printed as part of the meter scale. I believe this to be a new idea. I have not seen such units for sale. Do we have anyone interested enough to start to work on it? The technology level needed is not high tech.

Mike


The
Hub

Troubled Times

Solar Cell

I just bought a radio shack cat. **No. 276-124A silicon solar cel**l 2x4 cm. Cost $4.99. I soldered on two leads. Not that easy a task they didn't want to stick. I recommend finding a solar cell with leads already soldered on. I already had a Laser pointer that I bought from harbor freight tools for about $12.00. I used a digital voltmeter that I bought in the past at harbor freight for $39.00. But they also sell some for $10.00 that would work just as well. I tested the current on some previous samples I have saved from the past. These were in 1/2" diameter round glass vials.

The solar cell current was highest when nothing was between the laser and the solar cell with a reading of 1.36 MA, to 1.28 MA for a Dec 94 low PPM sample, to .58 MA on a Jan 95 high PPM sample. I held the solar cell right up against one side of the vial and the laser pointer against the other side. Turned down the lights and clicked on the laser and took the readings. Bit crude but proved the concept of workability.

Did notice some things: The current output spread looks great enough to be easily measurable with the proper length of laser beam travel in solution. The rounded glass vial deflected the beam such that it came out the other side of the vial much broader in width. Nearly as wide as the solar cell. The beam coming out the other side had about the same height. The 4"-6" of travel I talked about earlier may not be needed, especially at higher PPM. I think our first tests can be done with a simple test tube. I do think a box or rectangle shape with parallel sides would be more ideal. This is so as to not distort the beam. If we use a test tube or round object we will need to position it as much as we can in the same spot each time. This so as to not get variations due to light dispersion of the rounded glass.

I have been doing some more thinking about the calibration process and the use of commercial lab tests and how to minimize this cost by use of one basic test sample only. If one produces the highest PPM sample that one can of colloidal silver. Then let it stabilize for say 2 months. Send for a official lab test of it's PPM. Using an appropriate amount of the high PPM solution prepare 5 standards at different lower PPM by thinning down each sample with water. For example say you start out at 400 PPM. If you thin it 50-50 with water you get 200 PPM. Now prepare your graph with 5 points on it as detailed in the earlier post. This may make it more affordable and encourage construction without waiting for some one to sell it.

Mike

Troubled Times

Silver Sources

Maybe I am overlooking something and can the following be bought in every radio shack or electronics shop. Where can people buy pure silver wire? I am about to build a CS generator myself.

Michel

Here's a link for scientific (research grade) materials. They have a searchable on-line catalog. I did a search on silver and found that they sell it in many different forms. Their wire is not offered by gauge, but by actual thickness. I am not sure if the prices are competitive to other sources, but at least you can order on-line and have the stuff sent out to you directly! I found this Alfa Site in my newest issue of *Physics Today* magazine.

Roger

I myself could not find any pure silver wire although I am sure it is out there some where. I did the next best thing. I have worn in my belt buckle for many years, a pure silver dollar. When I could not find any wire, I bought another pure silver coin from a coin shop, took it to a jeweler next store to him and had the jeweler roll out the silver dollar for me until it was a flat, wide sheet of silver. It looks similar to a knife blade after it was rolled out. I then cut strips from this sheet with scissors and used those instead of wire. It worked great for me. Necessity is the mother of all inventions.

One thing I try to do is use what ever resources I have available on a local scale to accomplish the mission at hand. Ordering silver wire from a web page or a catalogue was not an option for me. I decided to make do with what I had available. 99.9% pure silver coins. (I think I have that I want it now attitude). These are here in town now and they will be laying every where after the pole shift. They will work even if I have to beat them flat with a hammer later. That silver wire doesn't have to be pretty to work as long as it is pure silver.

Clipper

As a source of silver, I use Silver Canadian Maple Leaf one ounce coins. They are 4 nines fine pure silver (.9999) and have been minted by the Royal Canadian Mint since 1988. You can find them at your local coin dealer or from Monex Deposit Company (800-949-4653) in multiples of 200 coins. They're also handy to have around in the event of a major economic collapse when paper money will be worthless due to skyrocketing inflation.

Michael

Troubled Times

Silver Wire

It isn't difficult to obtain pure silver wire . In addition, you need to have that coin assayed to be sure that it's at least 99.9% pure. It very likely is *not*. If that's the case, then you're gonna get other metals in that colloid solution besides silver. Nickel is a common 'hardener' used in the smelting industry and you don't want to be taking in nickel. I listed the names of 2 or 3 places where you can buy pure silver wire under the heading of parts and supplies in my posting of how to make your own Colloidal Silver in Troubled Times.

These metal dealers won't sell you just a foot or two, though. You have to buy a minimum quantity. We buy a couple of hundred feet at a time. Our standard electrode set is 6" silver wire (99.9% pure) bonded to a 3 foot rubberized cord with a pre-molded 3.5 mm gold plated mini-plug at the other end. We make them available for $15. plus $1 postage. This is the cheapest way to go if you just want a single set or two. If you want to buy your own wire and put together a bunch of electrodes, the lowest minimum order metal dealer that we found locally is David Fell, Inc. in the City of Industry, CA. The address and phone number is listed in my CS article posted in TT. If anyone wants to obtain a standard silver electrode set (or custom-made length) from us, just e-mail me directly.

Robert

Try a jewelers supply house or catalog for pure silver wire. I get the Rio Grande Gems and Findings catalog and they carry pure sterling silver wire, hollow and solid.

Travis

I get silver electrodes for colloidal silver making from:

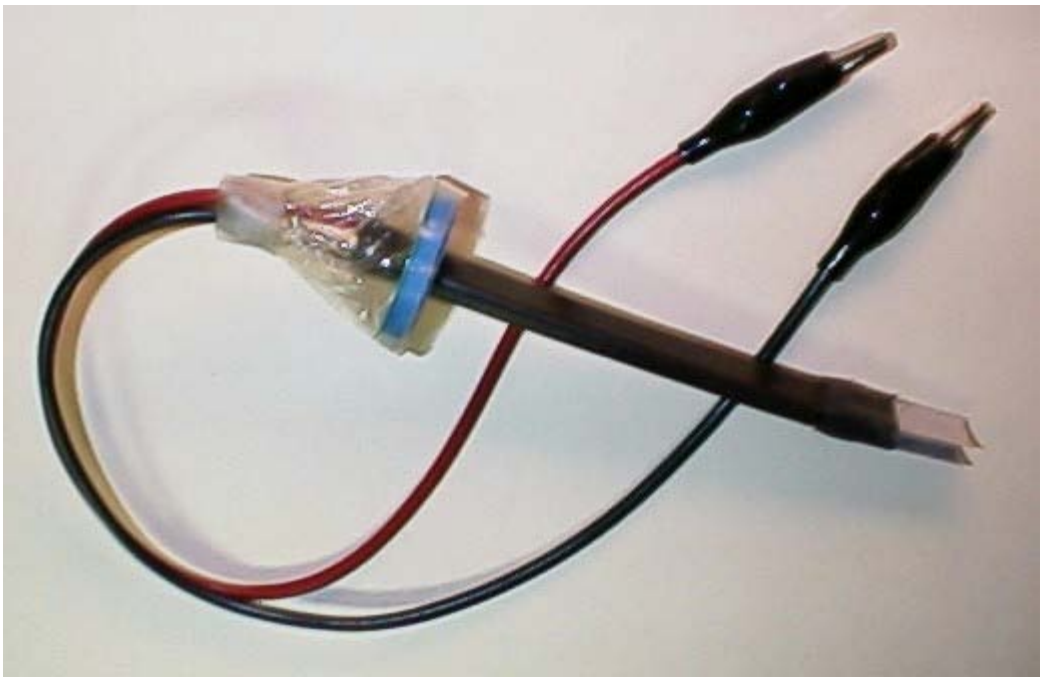
Rio Grande tools & equipment
7500 Bluewater Road NW
Albuquerque, NM 87121-1962
telephone 1-800-545-6566 (USA)
1-800-253-9738 (Canada)
1-505-839-3011 (other countries)

Silver anodes

Order number 101-928 this is .999 fine silver with a weight of .45 Troy oz. for each 1"x 6" by 28 gauge thickness - cost is about 1.83 times current silver price. Each electrode cost $3.74 in Jun 97 the last time I bought some. It is what I currently use and like the best. One strip cut in half makes two electrodes. I insulate all but the last .75 inch with heat shrinkable tubing. Once this end is eaten away I cut back on the insulation. I estimate the full .45 oz of silver to make about 40-50 gallons of Colloidal Silver of the 100+ PPM type.

This picture is the result.

One can also get 18 gauge .999 fine silver at about $.86/foot (Jun 97) and 4 gauge sterling 92.5% silver (not recommended) at $7.74/foot (Jun 97) at roughly about the same factor



above current silver price. All of it is sold by the ounce. I order as a hobbyist. Aside from this your local jewelry manufacturing supply company should have equivalent products. Pure silver strips are also available from:

Academy Metals and Supply
3201 4th St. NW
Albuquerque, NM 87107
(505) 344-8323.

Mike

Troubled Times

Colloi-dal Silver TEAM

Beginner's Q&A

Cloudy CS water, black flakes, water turning black afterwards.
Question, Answer 1, Answer 2

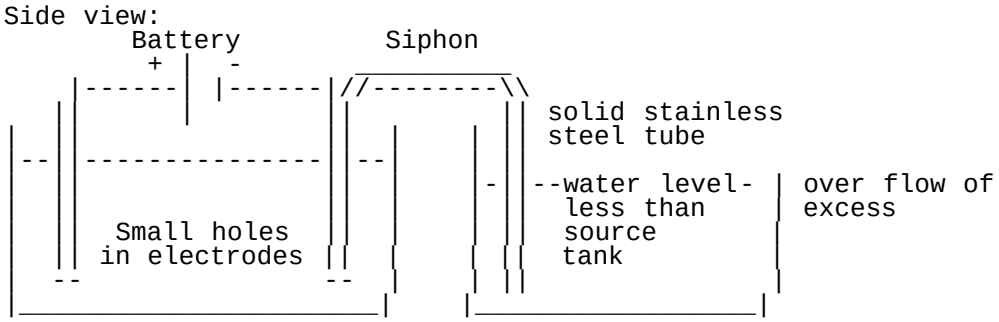
The Hub

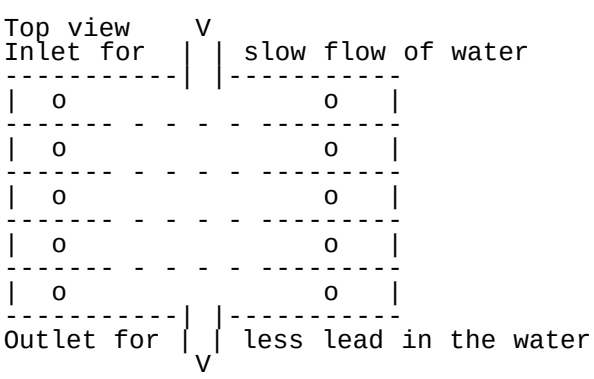
Troubled Times

Experiment

Proposed experiment for those who can test for lead levels. Lead and other metal particles in solution fine enough not to be filtered out by a particle filter will most likely have a charge on them. The assumption is we don't want to keep the water that has in it charged particles or Ions whether positive or negative. With these assumptions one can build a simple water enhancer. We concentrate this charged water in an area that is constantly being draining off to waste.

Example of how it might be tested: Take several small stainless steel pipes about 1/4 to 5/8 inch in diameter. Drill very small holes through the walls on all sides for the area that is below the water. Use fewer holes as you approach the water surface. Seal off the hole in the bottom of each pipe. The battery voltage causes Ions and charged particles to accumulate near the electrodes. A slow flow using a siphon to a separate reservoir is used to suck this water with high concentration of Ions or particles to a separate container and then to waste. One would send to waste more water with this method than conventional filters. I am also not sure of the amount of power needed. The water flow, electrode spacing and voltage would all need to be adjusted for optimum performance. If one wanted lower lead levels then more stages would be used. Each stage could be much longer than I have shown it. This would allow for slow flow of water past it so the Ions have time to migrate to near the electrodes and get sucked out. You want Ion migration to the charged plates to be faster than water flow through the device. I expect from time to time one would need to pull and scrub/sand off from each electrode the accumulated lead and other metals that plated out.





Anyone willing to volunteer to test it? I am tied up with some other projects right now.

Mike

Troubled Times

Frequencies

Here is a list of interesting radio frequencies. They are mostly associated with hurricane activity, but many are also used for other emergency situations. For newcomers, Novice can work portions of 80, 40, 15, and 20 meter bands if I can remember correctly and the rules haven't changed. The best bet would probably be 15 meter band.

- Sources
- Hurricane
- Amateur
- Global

Ron
WB5KAN

Troubled Times

Ham Classes

Ham radio classes put out a Big Welcome for newcomers, and are filled with old timers willing to share their knowledge. Help with Preparation is also available. With a number of Troubled Times members taking classes, they are giving each other Encouragement to go On the Air.

Troubled Times

Coordination

I would like to point out that setting a particular "contact time" for while the earth's rotation is stopped is futile prior to the pole shift for HF radio. Propagation characteristics are a function of the sun's position relative to the two sites attempting communication. We will have no idea what that will be during the period of no rotation. After earth resumes normal rotation, and each location is able to establish the exact times of sunrise and sunset, it will then be possible to utilize propagation charts to determine the optimum time windows to other sites. So instead of establishing a set time prior to the pole shift, we need to do two things.

1. First establish general guidelines for xmit/listen time windows for when propagation is favorable between individual sites.
2. Second, add general propagation information to the web site so that one can determine the optimum window to a particular site. I will volunteer to provide this write-up.

Note: These comments apply to HF propagation *only*. VHF/UHF communications over a line-of-sight path are not affected in the same way and should be useful 24 hours a day except possibly during the 12th's passage due to magnetic interference.

Ron
WB5KAN

Troubled Times

Call Signs

The new call signs are posted on the web. Check out:

- http://callsign.ualr.edu/callsign.shtml

Toni

Troubled Times

Keeping Track

For those who wish to participate in keeping track of slowing of earth rotation please send me the following information. Use your more accurate battery operated quartz watches or clocks. Generally these are the ones with LCD (liquid crystal displays). The ones with moving hands are more inaccurate due to the variation of friction of the moving parts. The first measurement of each clock will go to establishing a base line and should include the following information. (note: can use phoned time or use an atomic clock or make your computer into an atomic clock with a utility - see http://tycho.usno.navy.mil/)

Example:

Date measurement made:	30 Nov 97
Clock description:	Casio black wrist watch (LCD)
Time Offset compared to standard:	2 sec fast
Time Standard used:	phoned time at 853 1212

The first time I will request this information on the list serve will be in April 98 during the change to daylight saving time. For more information see the Slowing TOPIC. Please provide the following information for each time piece you wish to use:

Date measurement made:	_____
Clock description:	_____
Time Offset compared to standard:	_____
Time Standard used:	_____

Please e-mail Mike directly with the information.

Troubled Times

Benefits

This project has two benefits.

1. Providing concrete proof of planet slowing. This will become evident with even the worst watches in the last weeks to months for sure. Some of us are hoping we can measure it well before this time. A standard is needed thus one must start now and test these watches to gain knowledge of how accurate they are over time and to establish a base line for each watch.
2. Those wishing to communicate by radio after the pole shift will need to keep track of time accurately over many months. It may be months before we make contact with each other. We can't be listening all the time or transmitting all the time. We simply won't have the electrical energy. Thus one time per day (perhaps a 1/4 hr) will be designated as communication first contact time. Due to planet stopping and starting - no telling what relative time of the day this will be. Once first contact is made then other more reasonable times can be agreed upon.

Troubled Times

April 15, 1998

The next time I will be asking for a time check with on-line Atomic time software will be 5 April 98 (daylight savings time begins). So look for and get your watches set up in the next month. The following software will update your PC clock to within a fraction of one sec of standard time.

> For Atomic Clock Time Synchronization Software - see:
> http://www.ntp.org
>
> I currently use "SetTime" for Win95 and NT 4.0, but others on the list could bejust as good.

The accuracy is there if you want it.

Troubled Times

July 12, 1998

Next Sunday 12 Jul 98 I plan to do a mid point time check. This is approximately half way between Daylight savings time starts and ends. A reminder: The purpose of this project is to determine the long term accuracy of your LCD digital time pieces. The reason to do this is for early measurement of the earth beginning to slow as the 12Th. approaches and to provide a known stable time measuring piece for after the pole shift use and to get us used to not being reliant on a atomic clock standard. I now have a spread sheet that calculates the results. I have nine entries. I need more volunteer test clocks. The calculation is base on determining the change over time in the amount of difference between our time pieces and a atomic clock standard.

If you have any kind of battery operated (not plugged into electricity) LCD (liquid crystal display) digital watch, travel alarm, or mantel clock it will work. It matters not the price of the unit. Some times the cheapest units are more accurate. For those who wish to test the long term accuracy of your LCD time pieces please follow the following procedure:

- Determine which software you are going to use and download the software to update your computers clock see: apr1598.htm
- Compare each of your time pieces to standard time and write down how much it is off before resetting the time. This step can be skipped the first time you do this for any given time piece. B = time offset before resetting the time. (note use "+" for clock time readings that are faster than or ahead of the standard atomic time, use "-" minus for time readings that are behind the standard atomic time)
- After the time is reset on each time piece, check it with your standard and write down the offset. A = time offset after setting the time. (note use "+" for faster than or ahead of the standard atomic time, use "-" minus for behind the standard atomic time)
- Fill in the following table:

```
Provide the following information for each time piece you wish to use:

Date & Time measurement was made: _____________________
Time piece description: _______________
Time offset before resetting (B): _____________________
Time offset after resetting (A): ______________________
time standard used: ___________________________

Example filled out:
Date & Time measurement was made: _5 April 98_10:31 AM
Time piece description: _MikeL Casio #3 sports watch__
Time offset before resetting (B): _ +35 sec__
Time offset after resetting (A): _-2 sec __
Time standard used: _ PC Software retrieving USNO Atomic time__

Variations on the following line:
Time offset before resetting (B): _ N/A battery dead __
Time offset before resetting (B): _ N/A first time __
```

- Send the information directly to me or keep it for yourself.
- The formula to determine drift per day is:

```
(LCD time piece delta from standard) = (Ap-Bc)/D
```

```
where D = number of days between measurements
      Ap = previous after setting measurement time
      Bc = current before setting measurement time
```

Note: The longer the period of time we keep track of, the more trust we will have for that time piece. Target for at least one year of drift data for each LCD time piece before we get close to the pole shift. It is the change in this time drift per each 3 month period that will tell us the planet is slowing down.

If one resets the time piece or the battery runs out before daylight savings time ends on 25 Oct 98 then simply re-record the steps 1-5 above and send me the readings.

For benefits of having a accurate time reference see:
benefits.htm

For a pole shift time standard used as a stable datum or as a stable anchor through troubled times see:
../../info/tinfo17m.htm

I have a spread sheet that calculates drift data over time for each time piece. This over time will show direct evidence of a slowing planet. The more time pieces we use the more accurate the results will be. I encourage your participation. The next time measurement will take place in October.

Offered by **Mike**.

Troubled Times

Oct 25, 1998

Next Sunday 25 Oct 98 daylight savings time ends (set clock back one hour). I plan to do a time measurement check. A reminder: The purpose of this project is to determine the long term accuracy of your LCD digital time pieces. The reasons to do this: For possible early measurement of the earth beginning to slow as the 12th. approaches; to provide a known stable time measuring piece for use after the pole shift; and to get us used to not being reliant on an atomic clock standard.

I now have a spread sheet that calculates the results. I need more volunteer test clocks. The calculation is based on determining the change over time in the amount of difference between our time pieces and an atomic clock standard. If you have any kind of battery operated (not plugged into electricity) LCD (liquid crystal display) digital watch, travel alarm, or mantel clock that displays seconds it will work. It matters not the price of the unit. Some times the cheapest units are more accurate. For those who wish to test the long term accuracy of your LCD time pieces please follow the following procedure:

1. Determine which software you are going to use and download the software to update your computers clock see the April 15, 1998 instructions.
2. Compare each of your time pieces to standard time and write down how much it is off before resetting the time. This step can be skipped the first time you do this for any given time piece. B = time offset before resetting the time. (note use "+" for clock time readings that are faster than or ahead of the standard atomic time, use "-" minus for time readings that are behind the standard atomic time)
3. After the time is reset on each time piece, check it with your standard and write down the offset. A = time offset after setting the time. (note use "+" for faster than or ahead of the standard atomic time, use "-" minus for behind the standard atomic time)
4. Fill in the following table:

```
Provide the following information for each time piece you wish to use:

Date & Time measurement was made: _____________________
Time piece description: _______________
Time offset before resetting (B): _____________________
Time offset after resetting (A): _____________________
time standard used: ________________________

Example filled out:
Date & Time measurement was made: _25 Oct 98_10:31 AM
Time piece description: _MikeL Casio #3 sports watch__
Time offset before resetting (B): _ +35 sec__
Time offset after resetting (A): _-2 sec __
Time standard used: _ PC Software retrieving USNO Atomic time__

Variations on the following line:
Time offset before resetting (B): _ N/A battery went dead __
Time offset before resetting (B): _ N/A first time __
```

5. Send the information directly to me or keep it for yourself.
6. The formula to determine drift per day is:

```
(LCD time piece delta from standard) = (Ap-Bc)/D
where D = number of days between measurements.
Ap = previous after setting measurement time
Bc = current before setting measurement time
```

Note: The longer the period of time we keep track of, the more trust we will have for that time piece. Target for at least

one year of drift data for each LCD time piece before we get close to the pole shift. It is the change in this time drift per each 3 month period that will tell us the planet is slowing down. If one resets the time piece or the battery runs out before the next measurement on 3 Jan 99, then simply rerecord the steps 1-5 above and send me the readings.

For benefits of having an accurate time reference see Benefits page. For a pole shift time standard used as a stable datum or as a stable anchor through troubled times see the Stable Anchor page. This over time will sooner or latter show direct evidence of a slowing planet. The more time pieces we use the more accurate the results will be. I encourage your participation. The next time measurement will take place in 3 Jan 99. I have been sending one notification of this project every 3 months.

Offered by Mike.

Troubled Times

January 3, 1999

I know it’s early, but here's my data:

Date & Time measurement was made: 1-3-99 12:48 am
Time piece description: Timex "Ironman" wrist watch
Time offset before resetting (B): **-20 seconds**
Time offset after resetting (A): 0 seconds
time standard used: PC software

Also, I'm disabling the automatic time updates so my PC clock can be used as well (per our previous discussion). The initial data would be:

Date & Time measurement was made: 1-3-99 12:48 am
Time piece description: PC clock
Time offset before resetting (B): **-4.93 seconds**
Time offset after resetting (A): 0 seconds
time standard used: PC software

Roger

Troubled Times

April 4, 1999

Next Sunday (4 April 99) is a planned end of 3 month time measurement check. Note: The clocks are set ahead one hour on this date. Daylight savings time begins (US). The purpose of this project is to determine the long term accuracy of our LCD digital time pieces and to ultimately measure the slowing of the earth's rotation as the 12th approaches.

Mike

Troubled Times

July 11, 1999

Next Sunday (11 Jul 99) is a planned end of 3 month time measurement check. The purpose of this project is to determine the long term accuracy of our LCD digital time pieces and to ultimately measure the slowing of the earth's rotation as the 12th approaches.

Mike

Okay Mike, Here's the cut-n-paste for my computer from **SocketWatch**:
[clock.tricity.wsu.edu] - Synchronized

- Stratum:2
- Reference Clock:204.152.184.72
- Roundtrip Delay:0.261 seconds
- Server Score:311
- Times Used:1

+0.41 seconds @ 7/11/99 6:21:29 PM.

And here's the update on my **Ironman** wrist watch:

- Using nearly updated computer clock

-135 seconds @ 7/11/99 6:27:15 PM

Roger

Troubled Times

October 31, 1999

Next Sunday (31 Oct 99) is a planned end of 3 month time measurement check. This is when daylight savings time ends in the (US). Turn your clocks back one hour after checking with Atomic time and determining the current difference.

The purpose of this project is to determine the long term accuracy of our LCD digital time pieces and to ultimately measure the slowing of the earth's rotation as the 12th approaches.

Mike

Okay Mike, here's my data:

PC clock: using clock.psu.edu, at 8:49:11 AM, -133.348 seconds
Ironman Wristwatch: same server as above, at 8:51:31 AM, +31 seconds

I am replacing the battery in the wristwatch today as well. I'll make sure the time is still correct when I do. BTW, the above times are Standard time. Socketwatch wouldn't have it any other way.

Roger

Troubled Times

July 9, 2000

This Sunday (9 July 2000) is a planned end of 3-month time measurement check. On this day we plan to check our reference timepieces with Atomic Time, keeping track of any current discrepancy. The purpose of this team project is to determine the long-term accuracy of our LCD digital timepieces and to ultimately measure the slowing of the earth's rotation as the 12th approaches. For those who wish to participate, send your readings to me, so I can update our spread sheet.

Mike

PC clock:

Name: gazette.bcm.tmc.edu
IP: 128.249.2.2
Source: 128.42.5.4
Stratum: 3
Delay: 0.245 seconds
Used: 1 time
-129.037063 sec @ 10:02:19 AM (7/9/00)

Ironman wristwatch:

comparison w/corrected PC clock
+12.5 sec @ 10:17:00 AM (7/9/00)

Roger

Troubled Times

April 1, 2001

This Sunday (1 April 2000) is a planned end of 3-month time measurement check. On this day we plan to check our reference timepieces with Atomic Time, keeping track of any current discrepancy. Our clocks are set ahead one hour on this date. Daylight savings time begins in the US. The purpose of this team project is to determine the long-term accuracy of our LCD digital timepieces and to ultimately measure the slowing of the earth's rotation as the 12th approaches. For those who wish to participate, send your readings to me, so I can update our spreadsheet.

Mike

Here's the data (using Socketwatch):

Original PC clock:

Time Server Name: time.ien.it
IP: 193.204.114.231
Delay: 0.346 seconds
Time correction: -138.119417 sec @ 9.35.54 AM (4/1/2001)

Gateway PC clock:

Time Server Name: ncar.ucar.edu
IP: 192.52.106.6
Delay: 3.595 seconds
Time correction: -8.696949 sec @ 9:43:58 AM (4/1/2001)

Ironman wristwatch:

using Gateway PC,
Time correction: +10 sec @ 9:47:00 AM (4/1/2001)

Roger

Troubled Times

October 28, 2001

This Sunday (28 Oct 2001) is a planned end of 3-month time measurement check. On this day we check our reference timepieces with Atomic Time, keeping track of any current discrepancy. Daylight savings time ends in the US and clocks are turned back 1 hr. The purpose of this team project is to determine the long-term accuracy of our LCD digital timepieces and to ultimately measure the slowing of the earth's rotation as the 12th approaches. Send your readings to me, so I can update our spreadsheet.

Mike

Here's the data (using Socketwatch):

Original PC clock:

-59 sec @13:14:00 PM (10/28/2001)

Gateway PC clock:

Name: tick.usno.navy.mil
IP: 192.5.41.40
Delay: 0.295 seconds
Used: 1 time
+498.803674 sec @ 12:51:20 PM (10/28/2001)

Ironman wristwatch:

+16 sec @ 13:10:00 PM (10/28/2001)

Roger

Troubled Times

Slowing Trends

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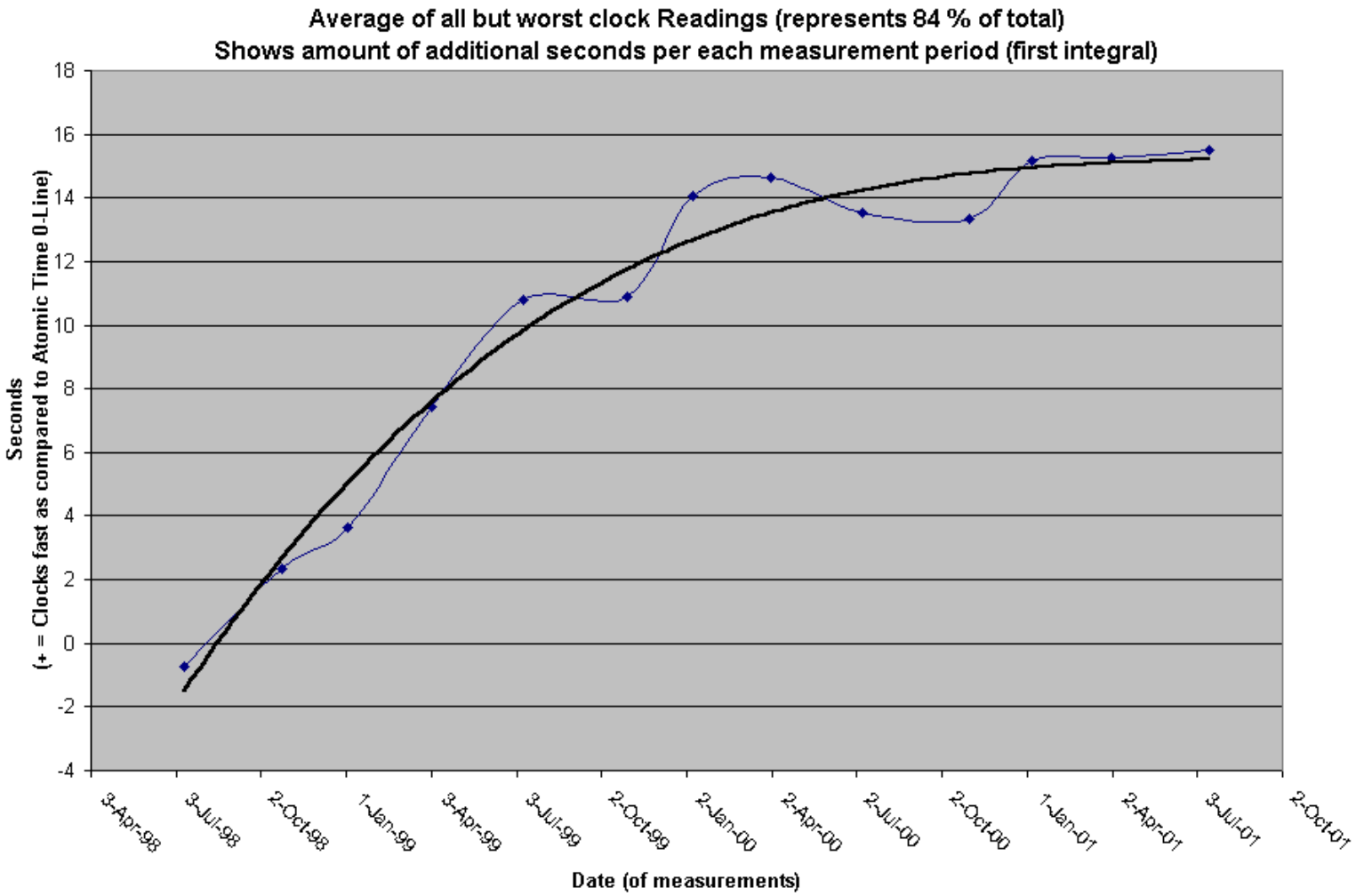
1. Comparison of our clocks to Atomic time results in an average of +40 sec/year for each the last 3 years (Jul 98 - Jul 01). This is added time making our clocks appear to run faster and faster each year.
2. Reported "Full Moon" events have a trend direction reversal of from +10 sec/year (1950-1985) to -22 sec/year from 1985 to 2001. This is effectively an earth slowing indication of 10+22= +32 sec/year.
3. Equinox trend data shows a change from about +1 sec/year (1950-1985) to +31 sec/year for the period from 1985 to 2001. According to the Zetas this indicates a slowing rotation of earth due to the indirect method of measurement used. I didn't understand at the time what the Zetas were saying. The Zetas indicate the current methods used by the Navy (a cheating method) are of measuring a star at night instead of trying to measure the angle to the sun in the daytime (impossible to accurately do - too bright and undefined edges and often over the ocean on a boat) and then calculating the actual Equinox crossing time. Because of this cheat-method the earth arrives late to the physical night-time measuring place and thus the needed +31 sec/year to come out precise so no one notices any errors. Otherwise if the exact time the sun crossed over the equator were measured the tables would have reported approximately -31 sec/year. The discrepancy in sign for this measurement is due to the way the event is actually measured as opposed to the way the equinox is defined.
4. Josh is measuring actual earth rotation time and will publish his results once something definite can be determined. He has already indicated that the earth is rotating slower by .54 sec/day than his expensive accurate stopwatch. Assuming this watch was in sync with Atomic Time within plus or minus .34 sec at the factory, then as he indicated he could already be measuring a slowing trend.

Summary-Analysis: Paragraphs 1-3 above strongly indicate a slowing earth. Note that the 31 to 32 seconds for paragraph 2 and 3 is talkingabout a 12 to 16 year time frame. Paragraph 1 with 40 sec over the last 3 years is talking about much closer to present time and would be expect to be bigger. If one uses 14 years times 31 sec we get about 434 seconds of estimated added time during this period. Assuming the documented leap seconds of .64/year (9 sec for 14 years) is subtracted this gives about 425 sec estimated current undocumented out of sinkness with the theoretical "stable Atomic Time standard" as it is defined.

How much other data can we find? Any indication of clock type problems with our satellites? Is our satellites loosing altitude to stay in sync with a slower earth? Has there be more need lately for user dish realign? Any clock manufactures noticed the slow down? What could 425 seconds (7.08 minutes) cause that someone could notice over the last 14 years? Any one wish to us there search capabilities?

Offered by Mike.


Average of all but worst clock Readings (represents 84 % of total)
Shows amount of additional seconds per each measurement period (first integral)
Seconds
(+ = Clocks fast as compared to Atomic Time 0-Line)
18
16
14
12
10
8
6
4
2
0
-2
-4
3-Apr-98
3-Jul-98
2-Oct-98
1-Jan-99
3-Apr-99
3-Jul-99
2-Oct-99
2-Jan-00
2-Apr-00
2-Jul-00
2-Oct-00
1-Jan-01
2-Apr-01
3-Jul-01
2-Oct-01
Date (of measurements)

Troubled Times

Updated for 2001

Results after adding 28 Oct 01 measurements. Used the current mathematical Calculation method. Added "Standard Error" calculated error bars to the source data plots.

Selected clocks representing 86% of the total are plotted. Selected according to the lowest standard deviation of the 2nd derivative data. Tossed out a few measurements (14%) showing the most deviation of absolute value from zero. Original curve: (A1), 1st Derivative: (A2), 2nd Derivative: (A3).

Selected clocks representing 60% of the total are plotted. Selected according to the lowest standard deviation of the 2nd derivative data (less than .0026). Original curve: (B1), 1st Derivative: (B2), 2nd Derivative: (B3).

Selected two of the best clocks TP10 and TP20. Selected according to the lowest standard deviation of the 2nd derivative data (both have about the same STDev). Original curve: (C1), 1st Derivative: (C2), 2nd Derivative: (C3).

The following is an average of the above three curves (D1). The next curve shows what happens if this average is extended to estimate an Accumulation of 1 Day Slippage by 15 may 03 (D2). Close up view of the bottom of above curve D2 (D3).

Summary: The trend over the last 3+ years shows a slope of 50 second per year speed up of our clocks when compared to Atomic Time. This is equivalent to a possible slow down of Atomic time because of added leap seconds by the same amount. There is always the possibility of this slope being due to battery discharging or other inherent error sources. The hope is by having lots of measurements (and many different manufactures) over an extended time that most of these errors are minimized. It is expected, as we get closer to the PS time that the slowing will become easer and easer to measure.

Mike

Troubled Times

Future Trends

I think in the next 1.5 years we can expect the curve to at some point start to really take off at a faster rate. I think we can expect to see something in between these two extended trend curves. Both of the following charts use the same measured average data curves that were previously published as D1. These are our conservative average results to date. Both charts have our measured change data being added to 24 hrs to get the total time for a day. This was done because trend line calculations of this type work better without negative numbers and it is more realistic to see the full day plotted. Each chart shows the same data using a different Y-axis scale to focus in on one trend at a time.

D2 shows one possible way to get from the present data trend to an arbitrary one day of accumulated slippage by 15 May 2003. I personally think more than one day of slippage will accumulate especially if the earth stays stopped for more than one day. However, to be conservative this extended trend line uses a 6 order polynomial to estimates the approximate slowing necessary to get from present time (01 Jul 2001) to 15 May 2003.

D3 Shows in more detail the bottom half of the curve. It also shows what a 5th order polynomial extended trend line will do, based on our current data. Note the oscillations in 6th order trend line. I have been noticing this in our data, however, not this large.

Summary: I think in the next 1.5 years we can expect the curve to at some point start to really take off at a faster rate. I think we can expect to see something in between these two extended trend curves.

Offered by Mike.

Troubled Times

LED Experiment

One person can only do so much, there are many parts of the problem to work on. I am presently working on what I consider to be a key component of such a biosystem. I am experimenting with an efficient photobioreactor which uses LED's as the light source. Presently I have a tank and a pump, the next thing I have to do is build the LED light panel. At first I am just using the cheapest LED's I can find, the wave length profile will be far from ideal, but it will give me a place to start getting some experience with the system, and hopefully some useful data.

Steve

I think the easiest thing to do is to measure biomass grown over a week or two. Start with a know amount of starter, go for a know time, total up electrical power for LED's used. Centrifuge or filter separate water from biomass growth. Can also use an air compressor or a old refrigeration compressor - connect suction side to boil off excess water - so that weight of dry biomass is measured each time.

Mike

Troubled Times

O2 and CO Monitoring

Growth efficiency is also affected by culture density, nutrient concentration, nutrient composition, temperature, pH, light intensity, light composition, etc. With all the variables it would be very useful to measure the rate of photosynthesis from moment to moment so you can see it change as you tweak things. I have thought of using an automobile O2 sensor, which would have to be heated to work, but I don't know if it will have the needed range. I will investigate other means as well as well as weighing biomass produced in a given time period as you mentioned. A microscope and a petri dish would be very good quality control tools to have. After all, that's how it was done in the early 20th century.

Steve

I see what you mean. All I can think of right now is carbon monoxide and smoke detectors are made cheaply and if you burn all the O2 leaving the solution. Monitor CO and smoke by modifying common detectors to measure voltage of sensed amount of gas. Would bypass circuit that trips to sound the alarm. Carbon monoxide detector (to protect babies) sell for about $10 at Harbor Freight tools. There is a link for this on TT. The only tricky part is bypassing the alarm circuit and taping into the sensing circuit only.

Mike

Troubled Times

Adjustments

During normal operation it would be nice for the average individual to be able to measure the efficiency of the process and "tweak things" so to speak. In this light a simple approach might be appropriate. The LED's puts out light. When algae grows it absorbs the light and gets bigger or more of it, blocking out the transmitted light. So why not put a photo cell (light to electricity conversion) on the other side of the tank. Measure current output as an indication of the amount of light getting through the algae. By plotting or measuring rate of light attenuation this should be related inversely to biomass growth rate. The amount of change over time (decrease in light) would indicate the relative efficiency of the growth, and tweaking can be done to maximize growth.

Now thinking later on - perhaps this idea could be used to automatically monitor and control some portion of the process say control amount of nutrients, when to harvest the crop etc.

Mike

The only problem with that approach is that the rate of light absorption doesn't really have a linear relationship to the rate of photosynthesis. You can, for instance, simply increase the light intensity and more light would be absorbed right? What you could end up with is shutting down photosynthesis altogether, because the cells chemical process will shift from photosynthesis to a mode of protecting the cell from damage. The same goes for nutrient concentration, too mutch CO2 or the pH way off and you get the same result. If there is a limiting nutrient also, it will not matter how much light is being absorbed, the rate of photosythesis will not follow. The most direct way of measuring the rate of photosynthesis is to measure O2 production.

Steve

Troubled Times

Algae Production

It is my intention to learn how to produce algae efficiently with the use of an artificial light source. The light source selected for testing is a random selection of LEDs (Light Emitting Diodes). LEDs were selected as a light source because of thier efficiency and durability. It is known that red LEDs would be the best selection, but I take what I can get and I can get a random selection fairly cheaply, we may collectively have to take what we can get also, so the test with the random selection my be useful. This light panel, once constructed, will be placed on the long side directed to the interior of a ten gallon aquarium. On the other side of the glass at the bottom is placed an air diffuser the length of the aquarium drivien by a 40 gallon aquarium air pump.

The tank will be filled with a nutrient solution, and seeded with either a Chlorella or Sprulina strain of algae. I intend to use powdered algea from the health food store with the hope that there are some live cells left in the powder. From here it will be a matter of experience. As I can afford to do so I will add instrumentation, valves, meters, heaters, gas cylynders to see how to get the most out of the system. If I can get the nerve up I'll let everyone know how the stuff tastes.

Steve

Troubled Times

Photobioreactor

What I am building is known as a Photobioreactor. It is known that factors contributing to efficiency in such a reactor are, a short light path, and turbulence. A short light path can be achieved with a wide flat light source such as the one used in the test, high turbulence can be achieved with bubbles. It is also important to have low hydrodynamic stress, so the cells are not damaged, so the bubbles are used for their pumping action also. You cant just run an algae cuture through aly old pump, it would become damaged. The final configuration of a production level reactor would have to be similar.

In addition I have built a calorimeter cell for measuring the efficiency of the light source. It consists of 1 1/2 inch styrofoam constructed into a shallow pan and lined with aluminum foil. This then covered with a double pane of glass and airtight (nearly). The Idea is to use a mass-flow approach to measure the heat of the air going into the calorimeter and compare that to the heat of the air coming out. The waste heat from the light can be measured as the light radiates out of the cell through the glass. The energy efficiency of the cell can than be calculated. I've been learning about ecology and bidchemistry from scratch and its taking some time to figure out what to do. Are there any ecologists or biochemists out there? I could use some help.

Steve

I have no problem with what you say, however It looks like we are taking about two different things. The over all intensity of light getting through the biomass would not be used to tweak the process. The acceleration of the decrease in transmitted light intensity (amount of change) could be used to tweak the process, and would indicate more rapid growth. This all would not be linear, but so what, it is still a indicator. This is all depending on how you have constructed your test unit. I am assuming a steady state production unit, light going in - biomass coming out in constant flow. If you have a steady state condition and you add more nutrients and the transmitted light goes rapidly down then it needed the nutrients. If the transmitted light goes up then it slowed the growth process down.

Mike

Troubled Times

Closed Ecology

In a way we are talking about different things, doing basic research is not the same as a production process. Do keep this in mind. We are talking about a microscopic biosystem, one without the huge sinks that nature has to smooth things out. If you can achieve a steady state what you say is fine. You know that a given airflow with a given CO2 concentration and a given nutrient density at a given temperature and pH with a given light output will produce a given flow of useable biomass.

But this is the real world we're talking about here, with many variables, and when something goes whacko we need the tools to figure out what's going on *fast*. I've just been reading "Life Under Glass" a biographical account of the Biosphere 2 project. After seeing some of the things they went through and the resources they had available to them I can better appreciate the concept of a closed ecology. Now we may not have to or want to achieve a completely closed ecology for long periods, but there may be periods of time when outside conditions are so bad that we want to be as closed off as possible. Then stuffs got to work right. I'd rather be over prepared if that is at all feasible.

That's why I'm doing this now. We can feed off the results of others research and print out stacks of data and reports from their findings, but it will not be useable if that cannot be translated into our rather unique application. It is certainly not fine science I am doing, I'm just trying to figure out how to make it work, and learning a lot in the process. I hope there are others out there doing the same thing.

Steve

Troubled Times

Day 1: September 9, 1998

The initial seeding source is a standard commercially available styrofoam plant starter kit with 28 slots(4x7). We are starting with 4 plant varieties, 3 bean varieties(yellow bush, green bush, red kidney) and heirloom slicing tomatoes - 7 of each. The seeds are not hybrids. The lighting source is a Quantum Device snaplite, placed 1” above the top of the plant starter kit. The Quantum snaplite emits a maximum 45 watts of power, though the power source itself has a higher and as yet undetermined wattage. The diode combination is 92% red and 8% blue. The red to blue diode ratio is 2:1. The increased differential is obtained by maximizing the red diodes and minimally increasing the blue to obtain the 92:8 ratio desired. On this unit, that is a red level of 1000 and blue at 160. At this level, there is direct light on 12 center plant slots with peripheral coverage of the other 16. Room temperature is 67 degrees F. There is no other light source. The room chosen could be used as a darkroom if necessary.

The water provided has a pH of 6.5 and the nutrients used have an NPK ratio of 8-5-18. This ratio is a standard commercially available ratio and was purposely chosen because of its commercial availability. While it is known that tomatoes and beans have slightly different nutrient requirements and this NPK ratio is not the perfect nutrient requirement, that is exactly why it was chosen. Most amateur gardeners do not have the capability to mix a perfect ratio. The objective is to simulate real world conditions, with the only variable being the light source.

The soil in the plant starter kit is a mixture of perlite, vermiculite and a touch of top soil for coagulation as previous experiences with perlite and vermiculite have shown that by themselves, the soil has a tendency to lack cohesion. Prior to placement on the plant starter kit, the soil was moisturized with a small amount of water containing the same attributes as the base water in the plant starter kit. In fact, that was where the water was obtained from.

The noise in the room is primarily from the Quantum Device snaplite, with occasional machinery noise from a water softener, iron filter, washer/dryer and furnace.

John

Troubled Times

Day 5: September 13, 1998

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3 beans have sprouted, all directly under the LED lamp. The 28 slots are referred to 1-7 left to right, going 4 back a total of 28 slots. Slots 13, 18, and 19 have bloomed with slot 13 ready to be replanted because of its size!

John

Troubled Times

Day 6: September 14, 1998

Two more blooms today - both tomatoes. Blocks 22 and 28. Nice to see a 28 as that is at the far reach of the light. I've got to replant that #13 slot bean plant tomorrow. It's blocking other slots it's gotten so big!

John

Troubled Times

Day 7: September 15, 1998

Slots 16 and 17 sprout. Slots 13, 16, 17, 18 are of sufficient size for replanting in the Rubbermaid tub with a mix of perlite, vermiculite and a “touch” of top soil for moisture retention on the screen porch at this point since I want to concentrate the light on the seedlings at this time and wasn’t prepared for the quick sprouting that has occurred.

Slots 3, 20 and 27 have also sprouted. Slots 3, 4, 5, 10, 11, 12, 17, 18, 19, 24, 25, and 26 are directly under the light with the other slots slightly off to the side. At this point, 3 slots directly under have sprouted(out of 12) 25% vs. 4 out of 16 not directly under (25%). This initially indicates that the light emitted peripherally is sufficient for sprouting and the level directly underneath is not materially better than the peripheral lighting.

John

Troubled Times

Day 8: September 20, 1998

Slots 3 and 20 replanted. Slot 22 has 3 new tomato sprouts. Apparently, more seeds than expected in this slot. At this point, all the beans that have sprouted have been replanted on the porch in the Rubbermaid tub. The tomato sprouts are still under the Quantum light (22, 27, 28).

John

Troubled Times

Day 12: September 20, 1998

No additional plants have germinated. Score is 11 out of 28. When transplanted, 5 tomato plants became 4 so we have 4 tomato and 6 bean. At this point, all the initial sprouts have been transplanted into two separate rubbermaid tubs (10 gallon) with drains and a vermiculite, perlite and slight amount of topsoil mixture. They have been watered with a hydroponic solution as outlined above. The tubs have been placed equidistant from the Quantum Device light so that the light covers 6 square feet beginning today. In addition, another tray of 28 seeds has been placed under the light. The light is now 14” to 18” above the tray, 16” above the bean plants, and 19 inches above the tomato plants due to the tomato plants small size. The bean plants are now 3 to 4 inches high. The tomato plants are barely an inch.

John

Troubled Times

Day 17: September 25, 1998

Of the 6 bean plants, size is now from 3 inches to 9 inches high. The height increase has little or nothing to do with distance from the light. The tomato plants have withered away. I think they were too small to be transplanted. We will try to generate tomatoes directly from this same soil (just for fun).

John

Troubled Times

Day 22: September 30, 1998

The 6 bean plants are from 4 inches to 12 inches high. The smallest is not the farthest from the light. It may have been transplanted too early. After 10 days, 4 bean plants have germinated and are from 2” to 4” inches tall, with the tray 14” to 18” below the light vs. the 5 days it took, 1” directly below the light. Two tomato plants have germinated and we are going to leave them in place until they are larger based on our past experience in this test. An additional tub has been added for the 4 bean plants transplanted. The light coverage area is now 7 sq. ft. We transplanted the largest bean plant the farthest from the light.

John

Troubled Times

Day 30: October 8, 1998

Light coverage is now 9 sq. ft. on the floor, with the addition of a tomato plant that germinated a total distance of 29” (as the crow flies) from the light. There are now 10 bean plants ranging from 6” to 22” in height. The beans closest to direct light are now the largest. The tomato plants are all still quite small, none larger than 2 inches. They are also farthest from the light. 3 bean plants have started to flower, all are the closest to the light.

John

Troubled Times

Day 35: October 13, 1998

Light coverage still 9 sq. ft. Still 3 bean plants with flowers; all are closest to the light and the two closest are 22” tall. The light is 20” above the soil, so the bean plants have started to curve around the light. Lower level leaves on two bean plants have turned white and are dying off. I believe this is because they don’t see any light because of blockage from higher level leaves. Tomato plants are 3/4” to 2” high, the two tomato plants closest to the light being the ones 2” high. After 35 days, it has become apparent that a relatively small distance from the LED light makes for a substantial difference in growth...almost a3:1 growth differential when comparing plants directly under the light with plants surrounding the light. Bean plants range from 22” under the light to 7” on the peripheral.

Tomato plants 2 feet farther from the light grow at 1/3 the rate. It should also be pointed out that throughout the nine square feet, growth is occuring, just at very different rates. The optimum growth coverage is a 2’x2’ area or 4 sq. ft., but it does cover 9 sq. ft.

John

Troubled Times

Cost Comparison at Day 35

At $1,000 per Snaplite without the power unit, this is a very expensive endeavor unless you are faced with a situation where you must provide virtually all the light in an environment for a prolonged period of time. The light's very strong benefit is little energy usage, 45 watts in the Snaplite and approximately 110 watts in the power unit. Since 9 snaplites can be attached to the power unit, the overall wattage used 515 watts when a unit is used most efficiently. This amounts to 81 sq. ft. vs. a 1000 watt halide lamp which covers about the same distance with the same growth pattern, a savings of 50%. In addition, the LED's last 15 to 20 years vs. 1 for the halide.

A look at the overall calculations:

		1 Year	5 Years	10 Years
Halide 1,000 watt lamp setup (64 sq. ft.)		$275	$275	$275
Halide 1,000 watt lamp		$80	$400	$800
Monthly electricity - 16 hours @ $.09 per kwh		$525	$2,628	$5,256
	Totals	**$880**	**$3,303**	**$6,331**
Snaplite lamp system (64 sq ft.)		$10,995	$10,995	$10,995
Monthly Electricity - 16 hours @ $.09 per kwh		$270	$1,335	$2,710
	Totals	**$11,265**	**$12,330**	**$13,705**

On a 10 year ROI, the snaplite is twice the cost of a standard halide system. Under the best of circumstances, Quantum needs to halve their price to meet market conditions or $500 per snaplite, though $250 would allow them to capture substantial volume in the indoor plant growth segment.

John

Troubled Times

Day 38: October 16, 1998

Another bean plant has sprouted directly from the aggregate soil provided. 2 mil mylar has been hung from the ceiling on one end of the growth area which is now 3'x 4' or 12 sq. ft. Visually, mylar seems to dramatically improve the light around the side it has been hung on. It should be interesting to see how the plants see it. Currently, all the plants are leaning significantly towards the middle as that is where the light is. We still have plenty of flowers on the beans, but no beans. The tomatoes planted 22" to 26" from the light are taking nicely. The tomatoes planted at a further distance than 26" have shown little or no growth.

John

Troubled Times

Day 40: October 18, 1998

Two tomato plants farthest from the light have withered. It should be noted that *nothing* has grown in this particular mix of perlite and vermiculite since it was used for Kamut over the summer. The addition of mylar two days ago has paid immediate dividends on the plants closest to the mylar. They are now pointing towards the mylar and *all* plants along the mylar edge have grown at least 2 inches in the past 2 days! We also have the beginnings of our first bean today.

John

Troubled Times

Day 43: October 21, 1998

Mylar 2 mil film has been added to the other side of the light. The two pieces of mylar are 4 feet apart. The light has also been moved to 28 inches above “ground” due to shadows and growing plants. For the smaller plants, this will reduce the intensity significantly, but give better coverage. The blue LED has been increased to 10% of the total light. This is because parts of the bean plants closest to the light have white spots. I surmise this is due to the plants inability to make clorophyll because of part of the spectrum missing. I’m assuming it’s the blue portion. If it’s the red spectrum, we have a problem with this unit that can’t be corrected. **General Hydroponics** micronutrient mix has also been added to the fertilizer just to make sure it’s not a micronutrient deficiency causing the white spots.

John

Troubled Times

Day 53: October 31, 1998

We now have two beans on one plant ready for eating. My wife's reaction: "Oh boy, an entire dinner". Sarcasm aside, the largest bean plant is 28" and the smallest at 5". The largest tomato plant is 5" with the smallest at 1 1/4". It is really apparent that this lighting device does not work further than 28" away. I feel very comfortable that the device works for 16 sq. ft. The mylar has improved the growth somewhat, to expand the sq. ft. coverage.

If you were to set this up on a large scale to minimize energy usage, I would recommend rows that are two rubbermaid tubs wide(on the large side) with mylar on one side and a walking row on the other. Putting a mesh covered spigot 4" from the bottom of the rubbermaid tubs for drainage and watering the soil(perlite, vermiculite, topsoil mix) has worked very well. This eliminates the need for pumps and the opportunity for the plants to really dry out if something breaks down. Plant leaf growth at 90% red, 10% blue is significantly better than last year under a halide lamp. However, that could also be the difference between the media used this year and rockwool which was used in 1997.

John

Troubled Times

Cost Comparison at Day 53

Therefore, you have the following comparison with a halide lamp:

		1 Year	5 Years	10 Years
Halide 1,000 watt lamp setup (64 sq. ft.)		$275	$275	$275
Halide 1,000 watt lamp		$80	$400	$800
Monthly electricity - 16 hours @ $.09 per kwh		$525	$2,628	$5,256
	Totals	**$880**	**$3,303**	**$6,331**
Snaplite lamp system (64 sq ft.)		$5,980	$5,980	$5,980
Monthly Electricity - 16 hours @ $.09 per kwh		$270	$1,335	$2,710
Mylar		$25	$25	$25
	Totals	**$6,275**	**$7,340**	**$8,715**

On a 10 year ROI, the snaplite is 37% more than the cost of a standard halide system. Under the best of circumstances, Quantum needs to halve their price to meet market conditions or $500 per snaplite, though $250 would allow them to capture substantial volume in the indoor plant growth segment.

John

Troubled Times

Day 58: November 5, 1998

Moved the LED light down to 20 inches above the soil as the peripheral plants were showing signs of dying.

John

Troubled Times

Day 71: November 18, 1998

Plants are dead that are more than 3 feet out from the center of the light. Even with mylar, the total coverage area of the Quantum snaplite is 9 square feet.

John

Troubled Times

Cost Comparison at Day 71

Quantum says with 1000 units purchased their price goes to $525. Assuming those numbers we get the following:

		1 Year	5 Years	10 Years
Halide 1,000 watt lamp setup (64 sq. ft.)		$275	$275	$275
Halide 1,000 watt lamp		$80	$400	$800
Monthly electricity - 16 hours @ $.09 per kwh		$525	$2,628	$5,256
	Totals	**$880**	**$3,303**	**$6,331**
Snaplite lamp system (64 sq ft.)		$3,675	$3,675	$3,675
Monthly Electricity - 16 hours @ $.09 per kwh		$302	$1,512	$3,024
Mylar		$25	$25	$25
	Totals	**$4,002**	**$5,212**	**$6,724**

Over a 10 year period, the snaplite from Quantum is approximately the same cost as using the halide system. If you found yourself in a scenario where light replacements & electricity were not readily available, obviously the Quantum system would be more reliable.

John

Troubled Times

Bill Mack

I'm talking with Bill Mack on details (I've included the content of 2 recent emails below). The sources I've used are: *Gardening Indoors with H.I.D. Lighting* by George F. Van Patton, *Hydroponic Food Production* by Howard Resh (very definitive work), and NASA studies listed in the Lumen TOPIC posted by John.

Steve F

Steve,

Here's what I propose: I design a board specifically dedicated to plant growth as we have discussed. I propose this PCB be approximately 11.5"L X 1.5-2.0"W and contain "X" amount and combination of LEDs. Since it is a strip, these strips can be side-stacked and added to accordingly and as people's budgets allow. That way you only buy what you need and initial costs are kept at a minimum. 12VDC would be the operating voltage so as to facilitate standard power supplies, solar, wind, hydro systems. UL listing could be negated because it would be classified as a "low voltage system". What do you think????

-Bill

>The NASA lights seem pretty excessive. What would it take to have
>lights in the 4,000 to 6,000 lux (400-600 fc). Beans, peppers, and tomatoes like
>this much light. Lettuce, strawberries etc need only 2000 lux. 400W high
>pressure sodium is good for 25sq ft of grow space, 1000W is good for 64
>sq ft. Rating wise, the 400W is rated at 243580 fc in 9 sq m, fc under
>bulb is 160060. What kind of LED system for a 2000, 4000 and/or 6000 lux would
>you recommend?

Steve,

I would be willing to do a SNAPLITE type of product but without the computer interface (that could be left for later should demand in sufficient quantities be there). You would be able to manually vary the intensity of each of the two tracks (RED 660 and Blue 465) and have as an option the ability to manually vary (via external pot) a pulse/flash rate.

-Bill

Troubled Times

LED Cost

Gee, if all he's doing is mounting led's on a board in our specified ratio, shouldn't we consider seeking a source for the LED's and make these boards ourselves? I had an electronics class a couple of semesters ago and if all he's thinking of providing is the completed board (no computer controls, etc.) then we could probably purchase the LED's, boards, and solder ourselves. It would be good experience for us to build these ourselves as we will eventually need to replace burnt out LED's in the twenty years of twilight.

Roger

I'm thinking along those lines also, but I'm going to find out all I can. He might be able to supply parts etc cheaper than I can buy or build them myself, so I don't dismiss anything. Plus, just the process of researching I learn a lot of other sometimes useful things along the way.

Steve F

I dug out my Jameco catalog (one of the more expensive suppliers of electronic components) and using John's snaplite info, I found that $400 would purchase app. 1000 red LED's, 150 blue LEDs, a couple of PCB's, and other tools and equipment as needed. This is for a single setup and as I said, Jameco is one of the most expensive suppliers. I have indirect access to a few other suppliers (through the physics department at K-State). Should I investigate further?

Roger

Not all LEDs are the same by any means. The higher output ones are usually in the 1-3 dollar range. There are also surface mount ones that give you 180 degrees of light as opposed to the 22 degree angle the regular, but more common and easier to work with, ones. The white ones, by the way, are actually blue with a white phosphur embedded in the resin. You're going in the right direction, but there is still a lot of research, at least on my part, to do. The more of us doing research, the more we can learn from each other. Through a university, the pricing and availability should be better. Keep looking at all alternatives.

As an example, at one point I was trying to find a supply of radium chloride to apply directly to a sandwich of solar cells surrounded by lead shielding, in effect creating a semi-free energy battery. Radium chloride is next to impossible to get hold of unless your part of the radiology department of a hospital, and is, of course, radioactive. I finally found a source in PR China, but at $3500 a mg, 200 or more grams needed to create a decent device is just out of the question, but I will continue to explore any and all avenues for lighting, energy etc., so should you.

Steve F

Troubled Times

First 3 Months

Well, it's been 3 months since we started growing lettuce, tomatoes and beans. Some comments:

- Lettuce is far and away the easiest. You just stick the seed in a small rockwool container and let it soak in a tray of water with appropriate nutrients(see any book on hydroponics), then once you have 3 leaves, take the whole rockwool piece and stick it in a piece of Styrofoam. It just floats on the water. pH is the only thing you really need to watch. Styrofoam is naturally acidic. Fortunately, our water is extremely alkaline, so we don't need to adjust it. With just two trays, we're kind of getting sick of all the lettuce.

- Beans were relatively easy in rockwool. Our problem was keeping the plants from falling over which was solved with string and tape(very high tech!) In the case of both the beans and lettuce, you could pick them and they would regenerate. pH was the most important thing to watch here.

- Our tomatoes are just starting to flower(3 months). I don't think the room was warm enough(70 degrees). The plants were also hard to keep up until we got into string and tape. pH was extremely important! The other hard thing about tomatoes is their requirement for pollination.

- We're moving everything outdoors now because it seems the frosts are over (finally!) and the electricity bills have been an extra $100 per month with a 1000 watt lamp. We didn't fully utilize it during the spring, just sticking our toes in this process. I would suggest to everyone that if you're going to do this, you give yourself at least a year to really understand it prior to needing it. Based on the Zeta timeline, that means get your butts in gear by Fall-98!

Offered by John.

Troubled Times

Lettuce Success!

Lettuce just sits in Styrofoam in a water filled tray on top of a milk crate. During an "event", this stuff will be all put away. By the way, the leaf lettuce we've been growing has just about reached the end of its natural life. Growing since March, and picked on an almost daily basis to provide dinner salads for 3, it's truly been the easiest and most economical plant to grow. Now the stalks (yes stalks) on these lettuce plants are about 2 1/2 feet tall, the lettuce is starting to get smaller and seeds have now sprouted in the top of the plant.

John

This is a fine example of how to re-seed your plants. Where to get your seeds from later, as something must go to seed to get more seeds. This could be very important, maybe a section of your hydroshed can be used for "going to seed plants" (of course you could eat your way there -:))

Clipper

Troubled Times

Darn Those Mites!

We brought strawberry plants in from outside to grow during the winter. What they brought with them was mites which have just appeared. It doesn't look like they've migrated to the other plants, but a strong lesson learned.

John

Troubled Times

Plant Towers

Do not buy those plant towers. You can't clean them and with any indoors situation, you have mold and have to periodically change the water. When you change the water, you wash off the mold. Problem is, the only way to change the water is to siphon with a hose, and then you still can't move the darn thing without having the very real potential of the plants falling on your head!!! (yes, personal experience). We were going to use it for the strawberries mentioned above because the very structure would prevent runner migration. It's easier just to clip the runners in another structure.

John

Troubled Times

Containers

These hydroponic companies sell these elaborate systems and now that I've been at this a couple of years, it seems to me the best thing to get is Rubbermaid containers (18 gallon ... 10 is OK, but not deep enough for many plants). Stick a hole in one side 3/4 to 9/10 down depending on the plants moisture requirements. Stick a drain in it (like in a boat) only without the cover. Put lots of earth in it. Make sure the earth is porous ... perlite and vermiculite are best but a little expensive. Get a 2 gallon bucket of water. Make sure the pH is right. Put your fertilizer in. Fill the container twice a week until water comes out the bottom and everything seems to grow nicely.

The beauty of this is other than the light source, no power is required ... no pumps (other than possibly for water) etc. Right now, I'm growing corn, potatoes and kamut on our screen porch. The corn is looking fantastic! I'm not sure about the potatoes since you can't see them. In fact, how do you know when potatoes are ready? The kamut is very weird looking. No seeds yet on that. Started all this around May 1.

Offered by **John**.

Troubled Times

Clipper's Tomatoes

Mother nature has not been on my side among other things this summer. I have three tomato plants left that are not dead. They are the Canning/Catsup tomatoes from the seed team.

- I transplanted them into a 20 gallon reptile tank with about 3 inches of solution inside. The tank is about 3 feet long.
- I cut a piece of white, two inch Styrofoam to fit loosely inside and it floats on the water. I cut three 2 inch square holes in the center of the foam.
- I then cut three pieces of panty hose leg about 4 inches long (don't tell my wife) and tied a knot in one end. I then stuck the panty hose pieces through the holes in the foam and held the top of it to the foam with toothpicks.
- I took each plant and gently cleaned all dirt from the roots and put one plant in it's panty hose holder. The plants are propped up in the holes with smaller pieces of foam.
- I have a fish tank pump, pumping air from two lines under the foam to aerate the water.
- I am using plant food called Schultz. A liquid food. It is 10-15-10. The water from our water tank is very basic on the scale. I wanted it neutral. I boiled some pine cones in a pan of water for about 1/2 hour and let it set until it was cool. I poured off the liquid (very acidic) into a cup and poured it into the solution. The water is a little cloudy now, but that's okay. It is neutral now.

I planted them on the 25th of August. The plants have grown about two inches so far since being put into the house. The new leaves that are coming out look great. Healthy and very green. The tank came with a full spectrum reptile light and that is what I am using. (The tank came from the Salvation Army and I paid $10 for the whole thing). If I learned anything this summer, it is how to dwarf plants for extended periods of time. These plants are only 4 to 6 inches tall and still alive. They were planted as seeds about Easter time. If these guys make it, they should be put into the Guinness book of records for the longest life span against all odds for tomatoes.

Clipper

Tomatoes need support. I don't see how you get that with what you describe. I'm just starting the indoor stuff again today, and I'm going almost exclusively with vermiculite, perlite and a little top soil in rubbermaid containers (10&18gallon) with a spigot near the bottom so they don't get waterlogged. I've found this to be much simpler than the "true hydroponics" described in all the literature. It also requires considerably less energy from an electric perspective and personal perspective. I've got to tell you. I haven't read *anywhere* where *anyone* has been successful doing tomatoes the way you're doing them.

John

Troubled Times

Second Wind

I had just about given up waiting for my lettuce to seed in my hydroponic garden. The lettuce had stopped growing and was beginning to die back. Just as I was about to take it out, it got a second wind and is now starting to flower. I like to say it takes patience but it was more inertia on my part. The Tom Thumb tomatoes have been so prolific that I had to eliminate some of the tomatoes from the stems, it was literally breaking the plants from the weight. Amazing. I think I'll try some other crops for food and seed and see how it goes.

Steve

Half a day is one of your problems. They need at least 10 hours of light each day and you should put the light as close to them as possible. Of course you will need to raise the light as they grow, but keep it as close as possible to keep them from feeling like they need to grow taller. Also, remove the plastic cover as soon as they sprout. If you have a small fan with a very low setting, position it so that it makes them move slightly. This will help to encourage them to grow strong thick stems and leaves and not get so spindly.

Roger

Troubled Times

Nutrient Sources

As this is also a new subject to me, I have ideas, but what I want to do is inform as I go. I have the basic ideas from the wealth of info that we have now on TT. (By the way, I want to build and produce *strictly* from the info on TT, kind of checks and balance. Is the info we have for folks to read enough for the novice to eat on?) If I run into snags, we can research info to fill this gap. One question I have already is "Where would one get the nutrients if there was no store to pick up supplies?" "Would lime work for this or that?" "Would coffee grounds or tea grounds give a certain nutrient to use?" (all hypothetical questions).

Clipper

What you'll have is soil around you, you're not going to have a mining colony, what you need is nitrogen, phosphate and potash. These are the major nutrients. You also need "minor" nutrients, but chances are you'll get them because you won't have a "pure" solution. Nitrogen can be easily gotten from excrements... they'll be plenty of that. I'm not sure about phosphates and potash.

John

What about campfire ashes?

Clipper

Troubled Times

Settling Solutions

A note or warning to anyone keeping hydroponics solutions. After a 6 month hiatus, I have started another crop of hydroponics Tom Thumb tomatoes. I noticed the solution contained crystals at the bottom of the container that would not re-dissolve by shaking. I don’t know whether heating the solution will re-dissolve the minerals without changing the chemical makeup. I'm going to take the lazy-assed approach and buy more solution and make sure I shake it up periodically so it doesn't settle; at least until I put a large enough setup together where I will start mixing my own chemicals.

Steve

Troubled Times

pH Testing

Today pH testing is pretty simple. Just get a kit from the store (swimming pool section). I don't know the chemicals involved, but they are extremely inexpensive, so probably easy to do once you know what you're doing. To adjust up, you add alkaline (base). To adjust down you add acid. There are several common products that contain these. Today, I just buy acid and base. I hardly use the base product, only when I screw up by adding too much acid as our water is very alkaline.

Offered by John.

Troubled Times

pH Meter Debate

Damark has a **Chlorine and pH Electro-Tester** Item No. B-40070-426137 on sale for $29.99 was $39.99, typical price is about $59.95. Call 1-800-729-9000 to order. Was in the just released Jul 97 catalog. Uses one AA battery. Is a white hand held meter with a two terminal probe for the water. Could be useful with hydroponics and gardening in general for pH measurements. For after PS I suspect it to be cheaper in the long run and to last longer and be more accurate than stockpiling pool test kits and or pH paper. One or more rechargeable AA batteries could be recharged from a 12V DC system with a simple limiting resistor.

A TT member who is into Hydroponics needs to check this out and verify it's workability-durability. I bought two of them however, it will be a while before I can use them.

Mike

The same thing is available at our local hypermarket (combination grocery and general merchandise store). It's much cheaper there, around $22 I think. If you live in the U.S., you should be able to see it in person ... check out **flower and garden places** ... they do work, though I am using the cheap stuff that doesn't require batteries.

John

I have not been able to find a **PH meter** of any type for sale in the places as described above. I live in a large city in southern California. All I can find is pool or soil test kits which use chemicals to test for PH. I did find I can order a PH meter for $40 from a pool supply store would take several days to come in. Perhaps if you could be more specific as to manufacture and product name for both types (battery and no-battery), I could call each manufacture and ask who sells it locally.

Mike

I'm really not interested in a ph meter because it requires batteries and I can think of better uses for batteries. Simple chemicals can be used to determine ph and they are available at every place that sells pools and/or **pool equipment**. Let's not make this complex.

John

Check out your local **Green Houses**. I saw them there already, even in Alaska.

Clipper

Then are you also saying your previous 2 email on this subject had nothing to do with **PH meters**? Still would like the answer to the question of the manufactures etc. if answer is no.

By the way the choice of batteries versus chemicals is one of long term cost and what you wish to stock up on. One or two rechargeable AA battery as compared to 10 to 20 years (or more) of chemical storage. What do you do when you run out?

Mike

I was finally able to find a simple pH meter with no batteries. Found it at a large Armstrong Garden Centers, Inc. Manufacture is **Rapitest** distributed by Luster Leaf Products, Inc. 2220 Techcourt, Woodstock, Il. 60098. Cost was $19.99 before tax.

Has one probe that is stuck into the wet soil that is made with two different types of metals insulated apart to make two separate electrodes. The acid or base of the soil makes a battery that moves a meter needle away from pH 7 (no flow or zero point) to Alkaline (positive flow) or Acid (negative flow). The pH scale runs from 3.5 to 9. The instructions for use are a bit complicated and include shining or removing the oxide from the probe before each use. Under tips on testing it says - Use the Meter Only in Soil. Do Not Place the Probe into Water. Don't see any good reason for this statement, unless if you let it sit in water for a while, water may seep past the plastic seal between the two electrodes and possibly short to some extent the electrodes from the inside out, decreasing it's sensitivity.

Plan to do some comparison testing once the Damark unit comes in. Will write up my comments.

Mike

Troubled Times

Test pH Often

As some of you know, I'm doing a lot with hydroponics. I assumed the pH in my water was a constant 8 as it was all last year and in September of this year. It changed a couple of weeks ago to 6.8 or so and it is doubtful my tomato plants will survive as I was adding acid as if it were 8 without checking since it had been consistent. **Don't ever do that without verifying the pH prior to adding acid.** That's why doing this ahead of time is important, get the mistakes out of the way while there is something else to eat.

Very interesting that the pH changed so dramatically just like that!!!

Offered by **John**.

Troubled Times

Alaska Hydroshed

The inside of the Hydroshed is now clean, though I can't say much for the yard. I have closed up the 12 foot open end and will insulate this wall soon. I have installed a system called Malibu Lighting Systems. It works from a transformer that is 120 volts and converts six lights (my model) to 12 volt. I have three lights up already (couldn't wait) and they work fine. I can get six 12 volt halogen bulbs to work for what I would spend on one 100 watt bulb, very economic and it also gets me going on 12 volt. The system is designed to go along walk ways that need lighted. I will do some research to see where one might get a Malibu lighting system. It also has a timer that you can set for 12 hours on, then 12 hours off. So, I now have an empty shed, gravel floor and three cute 12 volt lights installed. Heck, I might even grow grass in there! Get my lawn chair and sunglasses.


Offered by Clipper.

Troubled Times

Malibu Lighting

This is an answer to a letter I wrote asking about my Malibu Lighting system. I asked about using headlights for lighting using my Malibu system.

> Date: Tue, 29 Jul 1997 08:46:30 -0700
> To: clip642@mosquitonet.com
> From: Amy Koller <amy@nightscaping.com>
> Subject: Nightscaping's Ask Bill
>
> Dear Clipper:
>
> If I understand your e-mail your Malibu lights are not Quartz Halogen. they are a very low grade incandescent - high on the red end of the spectrum. You need honest Quartz Halogen lamp such as GE type MR-16. Yes, the new not over 2 years old outer head lamps are close to full color spectrum. However, they require 12.8V DC and draw approximately 35 amps each. Your Malibu transformer is good for 8 - 10 amps at most.
>
> Bill

My Malibu system runs 6 18 amp lights at the present, and is built to operate at 108 amps max. So that is six 18 amp lights or 3 35 amp headlights. The transformer has 108 amps max written on it.

Offered by Clipper.

Troubled Times

Windshield Pump

I want to use old auto windshield washer pumps (12 volt) to pump the water to the plants.

Clipper

I suspect that a auto windshield washer pump will not last very long. It is designed for a short duty cycle, to be run for short times only. Due to this it may heat up possibly burn out and/or the bushings on the motor shaft will ware out quickly. If you put it on a timer and ran it for a short time only it may last longer. It will be interesting to see how long one of these things will last, so you can tell others what to expect.

Later on if you need a 12 volt dc pump, you might try your local marine supply house. I saw some inexpensive submergible bulge pumps starting at about $10 and up. The $10 unit pumps 350 gal/hr and use a 1/2" hose. It looks like a 2-3" cylinder about 3-4" long. The higher priced units are again more longer lasting. A RV place may also have small 12 volt pumps.

All other kinds of pumps that I can think of (water cooler air-conditioning pumps, aquarium pumps, etc.) are 110 volt AC.

Mike

Thanks for the info Mike, I kind of figured a windshield washer pump would burn out as I am aware that they are designed for intermittent use. But, we need to know how long they last for information purposes. There are lot's of places where 12 volt pumps can be bought, but I am trying to figure out what may be just lying around for folks to get at easily. That would be the biggest purpose in the whole experiment. An experiment we can eat :-)

Clipper

Troubled Times

Onan Generator

I bought a new generator today. It is an Onan 60,000 watt butt-kickin diesel. I got a good deal on it, so we bought it. As heavy as it is, it will take one heck of a wind to blow it away! I bought it for construction of future projects.

Clipper

Well done. Onan is Good brand. What voltages and frequency (50, 60, 400 hertz) do you have on the output panel? I assume it's used? Is the engine in decent shape? Engines wear out first on these things. You may want to stock, common parts that ware out rapidly. Consult Onan parts house. Storage of Diesel fuel would be less dangerous than gasoline. How many people do you think this will support?

Mike

We had it running the other day, and since I drive a diesel pickup, I could tell the engine was in great shape. Two cylinder air cooled. The voltages and frequency rates I am not sure about, but I will look and let you know the next time I am at the shed where I put it. I went mostly on how good the engine was and brand name. And faith.

Clipper

Standby KW 6 KVA 6 Amps 25
Continuous KW 5 KVA 5 Amps 20
A.C. Volts 120/240 Cycles 60 Phase 1 P.F. 1
Exciter 04SX1N1A 12 volt, negative ground (battery start)

Saw nothing on frequencies or Hertz. And yes it is used. The guy that had it ran two small apartments and a trailer on it. He also used it for construction. Onan is a division of Studebaker Corp.

Clipper

Hertz = Cycles
KW = KVA = 1000 watt
5,000 watt generator is better fuel economy than the 60,000 watt. Looks like a useful unit.

Mike

Thanks Mike. Some day we hope to be able to convert it to wind or steam.

Clipper

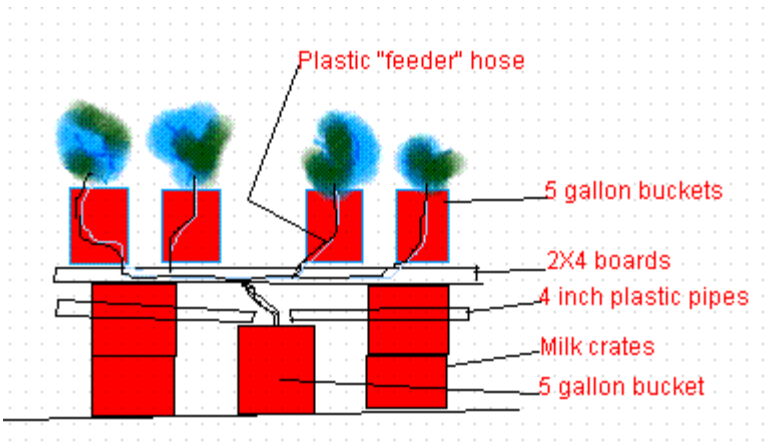
Troubled Times

Milk Cartons

I was at the shed thinking about the setup for stands and such for the hydroponics plants. I came up with a cheaper method to build the plant stands. I am using milk crates and five gallon buckets along with a four inch piece of plastic pipe for the drain back into the bucket of solution. They are everywhere that cows aren't! The milk crates are the support for the plants. If you look at one of your milk crates, you will see that the handle hole is shaped in a half moon shape. They vary depending on the distributor, But the handle hole is perfect to lay the 4" plastic pipe in for the drain.

I want to use old auto windshield washer pumps (12 volt) to pump the water to the plants. It then runs through the gravel holding the plants contained in five gallon buckets. The water then runs through a hole in the bottom of the bucket onto the four inch plastic pipe that will be cut length wise as a drain and back into the solution bucket under the bench.

This a simple way to build and a lot cheaper for most. Five gallon buckets and milk crates are out there by the zillions. Most restaurants will give away old buckets and sometimes milk crates if you ask them and tell them you want to experiment with hydroponics. Most people in general like to help you do projects if you just ask them. Human nature. Makes them feel good about them selves.



Offered by Clipper.

Troubled Times

Teeter Totter

An idea for a no-pump low-tech hydroponics setup. Two parallel V shaped wooden trays as you have designed say 4-8 ft. long structurally connected at each end. Separated about the width of approximately 1-2 trays. Provide a pivot point at each end centered between the trays. End view would look something like this:

Where "A" is the pivot point and "V" are the trays. Bottom ends of each tray connect with a pipe running to the bottom of the adjacent tray, so nutrients can flow easily from one tray to the other. From time to time walk up and push down (stand on it) the tray that is up in the air until the liquid runs into that tray and holds it down. The amount of up and down motion should be no more than to just drain the tray that is up. Each tray should be mounted such that its top is level when it is down and full of liquid.

My comments on the idea: This set up would only work if the plants liked to be wet then dry half the time. The unit can not be made too big so as to be too heavy to push down. The connecting tubes need to be big enough so as to not wait too long for the water to run from one tray to the other. Wouldn't use this with climbing vines or tall plants. This type of setup trades more sturdy structure or building materials for an electric pump. If electricity is available it's probably better to use a electric pump type setup as previously described. This is just an idea that someone may develop on to work out the rest of the bugs and possibly find an appropriate use.

Offered by Mike.

Troubled Times

Water Loving

Looking at this and reading what you said, I bet if we tried hard enough, we could figure out how to use pulleys and weights to make this thing operate on its own with the weight of the water being transferred from one box to the other. When the full-of-water box sank down as far as it would go, it could trip a self re-setting lever that would release a weight on the other box, pulling it down to the tripping lever on that side releasing a weight and so on. If this was possible, It would not have to be manned or have electric. Pulling the weight back up may be a challenge, but we could let gravity work for us.

Clipper

This set up would only work if the plants liked to be wet then dry half the time.

Mike

This limits the plants you can work with. For instance, lettuce likes it wet always while others have to have porous soil. You should get a book on hydroponics to see what plants this would work with. I'm not familiar with any but by no means am I an expert.

John

Now that I look at it again. One could use a water loving plant on one side and plants that likes it dry most of the time on the other or leave one side a temporary storage reservoir with nothing growing.

Mike

Troubled Times

Q&A: Biological Clock

What is the biological clock of tomato plants so that we can induce the plant to flower? How much light (X numbers of daylight hours and Y numbers of darkness), and at what stage (Z numbers cm tall) is the best to induce it? Should one cover the plant in a black plastic bag for the remainder of the 24 hour period? That is what I understood being done by the Florist to force/induce the plants to flower at any time of the year, by manipulating the biological clock of these flower plants, but then they will not reveal the biological clock to anybody because it is their bread and butter in selling flowers.

Tian

Tomatoes grow best at 4000 lux, 18 hours a day.

Steve

Works well with 16 hours of light.

John

My indoor tomato plants are doing quite well with 12 hours of light. Sometimes they get less, sometimes they get more. I try to put a little randomness into the process to copy the patterns of cloudiness, etc. (Basically I do not have the lights on a timer so I often forget when I turned them on) Also I don't believe there is a magic height that they have to attain in order to start blooming. I keep mine trimmed to 18 inches tall because that is as high as I can raise my lamps and I have blooms on every one of my 6 plants and three small green tomatoes as well. I built the 'incubator' for seedlings and have no other means of growing these tomatoes indoors. I use 4 40W fluorescent bulbs (4 foot long).

Roger

Troubled Times

Q&A: Trim Branches

Do you have to trim the lower branches of a tomato plant so that the plant will have more yield?

Tian

It is best to trim off the suckers between the leaves when they are 1-2 inches(2.5 to 5cm) long by hand instead of a knife - less danger of spreading disease. As the plant matures and fruit is harvested, the *yellowing* leaves below trusses (fruit clusters) that have been completely harvested should be removed. Do not remove green leaves, as they nourish the maturing fruit. At all times, about 4-5 feet (1.2 to 1.5 meters) of foliage and fruit clusters should remain on the upper part of the plant. The above applies to tomatoes, cucumbers and peppers.

Steve

Yes, you must do this before it starts flowering.

John

This is something I have never done (except for removing the suckers, of course). I have never heard of removing leaves at any stage of the tomato's life, let alone before it starts flowering. I have noticed that outdoors, these yellowing leaves eventually dry up and fall off, but I always consider this a natural part of the plant's life cycle and have never considered speeding up the process. Perhaps this is something that must be done in a hydroponics system.

Roger

Troubled Times

Q&A: Fertilizer

Assuming, after the pole shift, none of the commercial fertilizers are available, can we use human excrement/urine for fertilizer in our hydroponics system? in this case for our tomato plants.

Tian

Have you ever seen tomato plants grown over a septic tank? Very prolific, though you don't want them to become too acidic from the uric acid (below 4-5ph), but not usually a problem.

Steve

Depends on desperation. I'd look for something else first.

John

Post pole shift there will be nothing else. You will have to find a way to sterilize the waste before you put it on your plants or into your hydroponic solution. Essentially, you do not want to create a loop in which microbes and parasites go from human (and other animals) to plant and then back to human (or other animals). The material present in liquid and solid waste does make an excellent fertilizer, but you don't want the microbes in it.

Roger

Troubled Times

Q&A: Grow Potatoes

Can we grow potatoes in a hydroponics system without soil? Has anybody tried this method?

Tian

Look at how NASA grows potatoes, look at the tuber inducing factor, and the candidate crop testing specifically. Don't let tubers become exposed to light or this could render them inedible.

Steve

I have sort of done this. I've put potatoes in an 18 gallon rubbermaid container with a mixture of a little top soil, perlite and vermiculite. Potatoes need a lot of nutrients. I got potatoes, they were just dinky. When I finally got a soil testing kit, I found there weren't nearly the nutrients needed, but it can be done. They don't require nearly the light of say, tomatoes, 12 hours a day is plenty.

John

I've had no experience with that here. I do know that exposure to light causes the tuber to transform its starch into a substance that is ill-tasting and if consumed in large amounts (with nothing else to dilute it) can cause illness, but it doesn't make the tuber inedible. I have eaten plenty of green potatoes and I'm still among the living (and didn't suffer any illness). Of course if your only source of food was potatoes and they were all green, this would be a bad thing, so the tubers should be protected from the light as much as possible.

Roger

Troubled Times

Q&A: Soy Beans

Can we grow soy beans in a hydroponics system without soil? And also do you know the biological clock for soy bean plants?

Tian

Don't know specifics on soy bean plants, though just about anything should grow hydroponically. There are short and long day soybean varieties though.

Steve

It's a bean, so you can do it. Rockwool works best with a continuous water system 3 hours on and 3 hours off. I'm currently growing beans in two Rubbermaid tubs (10 gallon). Lot of good beans that will be available to the Seed TEAM shortly. Again, the mixture is vermiculite, perlite, and a little top soil.

John

I have no experience with soybeans, but as John says, it is a bean.

Roger

Troubled Times

Q&A: Induce Flowering

How can we induce more flowering in a cucumber plant, to get more yield without fertilizer? Will the biological clock method work?

Tian

Cucumbers, tomatoes and peppers have about the same requirements each. Cucumbers grow best with 6000 mWm2 of light, 16 hours a day.

Steve

Cucumbers have little nutritional value. Haven't tried.

John

I've never had a problem with lack of flowering in cukes so I have no suggestions to give other than to make sure the temperature is warm and stable. Little nutritional value, perhaps, valuable nonetheless for culinary diversity. Shredded and pickled, they become a condiment, sliced and pickled they are also a condiment and provide vinegar that aids in digestion, simply sliced they become a salad topping that helps one to avoid culinary boredom.

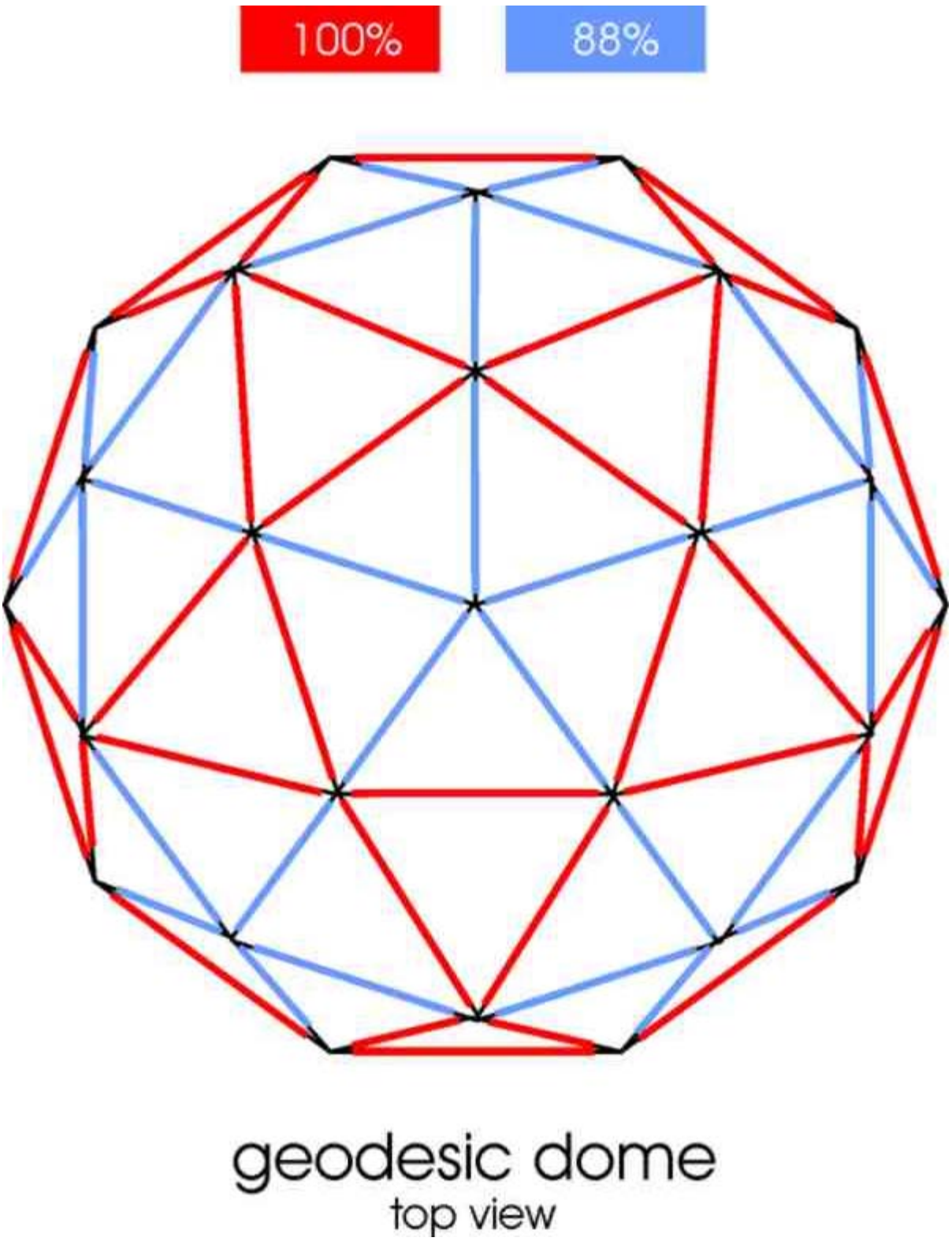
Roger

Cucumbers are an excellent source of silica

Janar

Troubled Times

Pipes Dimensions



Troubled Times

Quadrangle

I came up with a computer model for a dome which possibly uses fewer parts than others. It started as a 12-sided dodecahedron, then quad-divided into quadrangles. Then I cut it in half to make a dome. Each of the 36 quadrangles are the exact same size and shape. If someone sees a reason that this design might be flawed, weak, or otherwise please tell me. It looks okay to me, if I don't get any problems with it then I intend to look into a fast, cheap, and easy way to construct it. I haven't quite figured out how many "sticks" you need. I'm guessing about 40-60 sticks, which is not that many.

If this is indeed a strong design, someone could collect and cut the parts beforehand, and construct the dome at the last minute if need be. You could keep all the framework parts in a box or bag somewhere. A 10' x 10' x 5' foot dome would be a small, but good short-term shelter, enough for 2 or 3 people to crunch in. Any ideas about what to cover the framework with after construction? Something with insulating qualities? The picture explains it better.

Offered by Joe.

Troubled Times

The Plan

I’m using trueSpace3 for Win95/NT. I modeled a solid 12-facet dodecahedron a long time ago (took forever to figure that one out!). Then today I used a "smooth quad divide" function which turned it into quadrangles for me. It's kind of an accident how it turned out, but since the whole dome is made from equal kite-shapes (where short to long ratio is 1:1.5) it should be relatively easy to construct, and uses less sticks then a regular geodesic dome. (though perhaps not quite as strong?). I still haven't figured out all the angles, once I do I'll post the info. I won't know if they're right for sure until I come up with a way to build a real model.

Let's say I made a small 10 x 10 x 5 dome with the quadrilateral design out of wood or metal. Then I stapled or used binding wire poked through the canvas to tie pieces of it tightly to the framework. Could you then mix up a bunch of concrete in some buckets and dump it over the top until you get a thick layer, possibly doing this for a few days to build layer after layer? Or would rain, time, or other things prevent this? Is concrete too expensive? Or would simply creating a thin outer canvas layer that is waterproof, like a tent, serve better? A dome tent might not blow over like regular tents can.

I think I know a trick to making a dome framework very easily. The dome-builder would only have to know how many segments to cut and what the lengths are. The builder would cut pipes of some sort to the proper lengths, and then run cable or rope through them to build small sections, which can then be roped together to form the finished dome. Obviously a roped-together dome might be a tad flimsy, so then you would have to wrap binding wire very tightly around each vertex, going over and under the pipes until it's strong. Then you could wire fabric to the framework to cover it like a tent and/or dump concrete on top. Or whatever. The best part is that the builder will not have to measure any angles, or any of that crap. Perhaps only a picture of the finished dome or a real good description would suffice. Does this sound reasonable to anyone? I'm going to try out some small models of various geometries.

Offered by Joe.

Troubled Times

The Discussion

The builder could get a template cut to the dimensions of the shape. Since it is a dome built of all the same shapes, all he would have to do is cut out his shape from pattern and go from there. The hardest work would come to the maker of the template. That could be made of paper. Like making a dress from a pattern. Different size pattern for different size dome.

Offered by Clipper.

Why don't you cut the pices out off steel and weld them or bolt them together?

Offered by Eric.

I'm talking about making a framework (like a jungle gym), not a solid as shown in my picture. I put that up to show what the dome made from kite shapes might look like. It's hard to model a framework on the computer but the solids are very easy. Sorry if I confused anyone. Sorry if I'm confused also. You could make a solid dome, but then you have leakage problems like someone else mentioned. Would seem to be a lot harder to build also than one made from pipes also. Hopefully the string and pipes idea might make dome frameworks very easy to make with the only measurements being the lengths of the pipes themselves. When you have an exact number of pipes made to the proper lengths and string them together correctly, they will force themselves into a tight dome shape automagically.

I don’t want to make it out of solid steel because the average human being doesn't know how to weld. Bolting requires corner peices cut at precise angles to bolt the pipes onto. Very difficult. Using the string and pipes idea eliminates all that crazy stuff and lets the average guy build the structure in a hurry--without measuring angles or other complicated things. You should end up with the same dome anyway. I'm building a model from string and straws right now to get more of an idea, though.

Offered by Joe.

Would it be possible to use tree branches as a source of material? Possible interlace straw or other long flexable plant to use as a roof?

Offered by Brand.

Troubled Times

The Model

I'm almost positive the string and pipes method of building a dome framework will work. I'm building a 12-sided dodecahedron out of xerox paper using oragami. I'm hoping I'll be able to stand on it when it's finished, seems pretty strong already. We'll see. Well I made it in sort of a hurry. Pretty neat though! It's holds itself together exceptionally well. But it's not as strong as I thought. I think if I carefully measured out stiff pieces of cardboard you might be able to sit or stand on it. We'll see.

I built a small dome from my computer model out of short pieces of drinking straws and twine. It formed itself into the proper angles for the dome shape automagically. Even though the model is a bit flabby at the moment (due to the straws being short and probably no tied together the best way), it still won't give out even if I press my hand very hard on the top. I'm going to make a new, larger model from full-length straws, which should be a more realistic one. The angles should be much more accurate then when using the really short pieces.

times passes ...

Well, the first dome I made was made from real short sections of straw, and was strung together rather tediously. It's a bit flimsy, but not too bad. It did form itself into the proper dome shape. I'm making a much larger dome from straws now using a different stringing method. It seems to be working much better. You don't have 1 piece of string per pipe. Instead you string rings of them together and then tie them vertically. Try this picture:

Layer 2 _____

Layer 1 /\/\/\/\/\/\/\\

Base _____

This is a real speedy way to make the dome since you use minimal tying. Sorry it's hard to explain. If I have some success I'll make a web page showing how to make this. I'm almost positive this method will work, especially considering after the framework is made on a real dome, you will then wrap heavy wire around each vertex to reinforce the joints. It should make a pretty tight dome. I went to the hardware stores looking for pipes, and found the steel electrical conduit (1/2 inch or 3/4 inch). It was very cheap, like $1.64 per 10 feet, and looked very strong. The poles were leaning up vertically up on the racks and were straight as arrows despite them being all piled up. I'm still unsure about what cable to use, etc, and even the geometry of the dome itself, but it's coming along. I just really liked this idea so far since anyone could build the thing extremely fast. It's not ultra-precise but that shouldnt matter.

Offered by Joe.

Troubled Times

The Results

Right now here's where I'm at with making model domes from straws:

- The first dome (as depicted in the picture I put up) was a dismal failure, although it's still my favorite shape.
- I found internet sites dealing with making spheres and dodecahedrons and things like that out of paper. I made 2 dodecahedrons so far, and am working on a large one now out of strong posterboard. You can throw the small ones I made up against the wall real hard without them breaking apart, despite the lack of glue tape.
- I made a small tetrahedron from 6 straws and 1 long piece of string, and tried to smash the thing between my hands. It didn't budge. Very strong shape. Now if I stomped on it, it would break because the twine I'm using is not all that great and stretches out. But you get the idea.
- Tried a dome-inside-a-dome, where the inner dome is attached to a slightly larger one with short segments. Didn't work this time but it might work on the geodesic.
- I'm making a whole geodesic sphere right now. I think geodesic might be the way to go, but only time will tell. (and it's taking a long time.)

That’s about it. The trick with this string thing is to use the tension of the string to hold all the stuff together, as in the tetrahedron, I think. So I'm making the geodesic globe with this in mind.

Offered by Joe.

Troubled Times

The Prolog

For those who are interested I'm still working on the cheapskate dome framework idea. I need to get some better materials, but after building about half of a geodesic dome (then running out of parts) with straws and string I believe the basic concept will work. Aside from the geodesic dome made from triangulated pentagons and hexagons, I think an easier and faster to build framework can be made but would have to be reinforced. It might work well because it depends on the tension of the string to hold it tightly together, almost like the dome tents on the market but not exactly. Hard to explain so I will try to make a graphic if I can make a relatively successful model.

I'm not an architectural genius so I'm open to ideas. I base the notion that you can probably build dome frameworks with straws and string on the fact that you can make a tetrahedron out of 6 drinking straws cut short and 1 piece of twine - not very strong materials - and not be able to crush it between my two hands easily.

One annoying detail is: How do you keep the dome on the ground? If you made a concrete dome you'd be OK, but what about a tent? You'd want to eliminate the possibility of it blowing over somehow! Even a rigid, aerodynamic, heavy tent structure might have problems if there weren't anything holding it down *real* good. Perhaps tying cables to large trees, rocks, or tying boat anchors around the tent's perimeter would suffice?

Offered by Joe.

Troubled Times

Conclusion

Important: Almost all of the information I posted a long time ago on the Parts thread should now *really* be removed. I accomplished the goal put forth at the end of those articles by making a geodesic dome the string & pipes way. Now that I *finally* know it works, the rest of the information should be updated. You might want to remove that part of the site, and I'll write up a nice article explaining the process of building a 2nd-level geodesic frame in the meantime. I don't want anyone else wasting their time trying my old stuff that's up there now since it don't work. Later I will probably build a 3rd-level model dome, just to see how it goes. Some nutcase somewhere might want to build something *large*. Level 2 should be good enough for small domes I think.

For those who need it, I can calculate the lengths for any level, even very large levels like 20 or 40. (yer talkin a *lot* of little pipes there!) The program (dome46.zip) doesn't give you the lengths, but I can derive the lengths for anyone who needs them from that program's output. If you need it, let me know the level. (please don't ask unless you're really going to build a model or something - it takes a lot of time to do this stuff. Thanks.)

Offered by **Joe**.

Troubled Times

Dirt Mound

I sent Joe a note about dome construction the other day. He's working on the quick, portable type, and it looks as if he's coming close to a viable solution. My idea was borrowed from an architect friend of mine who specializes in earth-sheltered construction, and it's a down and dirty way of erecting a thin-shell reinforced concrete dome without a conventional framework. It's similar to the inflatable balloon method being used today, except you substitute good old dirt for the framework. Here's how it works:

- Dig a circular trench and pour a "ring beam" as a foundation.
- Mound dirt up in the center to form a "mold" in a dome shape. (Have a hill? Use it!)
- Cover the dirt with construction plastic.
- Use 2X6 lumber to define openings, etc.
- Place wire mesh and/or reinforcing bars bent to the shape of the dome.
- Cover with concrete.
- When cured, dig out the dirt! (labor intensive, but cheap!)

The plastic keeps the dirt from sticking to the concrete (that would be messy). You'd need low slump concrete to keep it from running all over the place, but it should be trowlable. Alternately, a swimming pool contractor could spray gunite or shotcrete onto your frame. The concrete thickness can taper from, say 6" at the base to 4" at the apex, it doesn't need to be all the same thickness. This, of course, only applies to those of you who are able to build any kind of permanent structure. I don't know how local code people would react to this either, it would obviously be on a region by region basis. Anyway, for what it's worth!

Offered by **Ron**.

Troubled Times

Expense Concerns

This sounds like the best idea yet, and seems fairly easy. Woudn't a ton of concrete like that would be pretty expensive, though? I haven't worked on my idea much lately, but I still think it could work. (the one where I was experimenting with various 'straw & string' constructions. The main problem I'm having is with the joints between the straws, I think there needs to be spheres between them of some sort to keep them spaced. I think if a metal framework could be made, then one could cover it tightly and either pour concrete on it in layers, or put some other material around it. Maybe even dirt would work, but it seems like that would wash away pretty fast with no plant roots throughout. Are there any other ways to successfully cover these domes other than concrete? Would even piling a bunch of junk and crap, old tires etc on top of it, *then* pouring concrete on top work? (hence using less concrete, just enough to hold all the junk together--only 1 application needed)

Instead of making solid concrete domes at high expense, what if you could make your dome framework (or dirt hill to be dug out later), but then gather as much junk and garbage as possible to pack around the outside. Once it looks like Sanford & Sons junkyard, you could then pour concrete swirls on the top--connecting all the junk together into a solid peice but using a whole lot less concrete. Does the dome have to be pretty? I know slick and aerodynamic is ideal, but maybe it would be solid enough anyhow. The only major problem I see is waterproofing, you might at least need a thin layer of concrete before you start pileing trash on top, or something.

Offered by Joe.

Troubled Times

Inexpensive

Joe wondered if all that concrete for a dome would be expensive... well, let's see:

- Assume a 30 ft diameter dome. That's 15 ft tall at the center!
- Assume that the parabolic dome is actually a hemisphere (close)
- Assume 6" thick wall at base and 4" thick at apex, for an average thickness of 5" (close)
- Use a 1 ft x 3 ft deep concrete perimeter ring beam footing (less down South, more up North) [see footnote]
- Use a 4 in thick concrete interior slab

Dome:
Surface of sphere = 4 pi r^2 = 4 x 3.14 x 15 ft x 15 ft. = 2,827 sft
Since it's a hemisphere, divide by 2 = 1,414 sft
Times the thickness to get cubic ft = 1,414 sft x 5 in. / 12 = 589 cubic ft
Divide by 27 to get cubic yards = 22 yards
Multiply times cost of concrete ($50 yard???) = $1,090
Ring beam:
Circumference of circle = pi d
Assume 1 ft. wide x 3 ft. deep x pi x 30 ft = 283 cft / 27 = 10 yards x $50 = $500
Floor:
Area of circle = pi r^2 = 3.14 x 15 ft x 15 ft = 707 sft x 4 in /12 = 236 cft / 27 = 8 yards x $50 = $436

Total Cost of concrete: $1,090 + 500 + 436 = **$2,026**

[I think like and engineer, so yes, these numbers are rounded off! That's OK, we're gonna double it when we're done!]

OK, we've spent two grand on concrete so far. For sake of the discussion let's assume the steel costs as much (it won't). Let's spend another grand on miscellaneous items like 2x6 lumber to frame the door and a nice little igloo style smoke hole at the top, and the plastic to keep the dirt off the concrete on the inside while we pour. We haven't insulated it. Styrofoam would be the best bet. The cost rises. So, for an entire shelter we spend $4,000 - $6,000, depending on whether you want it to be a "home" or just a place to hide out till the sun returns. I realize that this is bare bones, but it's bomb proof, earthquake proof, wind proof, and the Native American ancestors (and descendants) would be proud of you since it's a true "earth shelter". Remember, this is the total cost for the "shell". No carpenters, no concrete formwork, just honest hard work.

F.Y.I. No, I'm not building one. I'm not into domes. Give me a cave any day. I've always been a hermit! But to each his own, and the most intriguing thing about this to me is the fact that a couple of people could build one of these in a week or so (working full time) and the concrete would be cured within a month. It could very well be somebody's solution.

P.S. If I made a mistake in the math somewhere, I already know I'm stoopid, so please don't rub it in!

[**Footnote:** North and South for purposes of frost line are to satisfy the building code people, who won't be too thrilled about your dome to start with! These directions won't apply after the pole shift, so I guess it's a moot point, huh?]

Offered by **Ron**.


The
Hub

Troubled Times

Viable Idea

I know we are to stay mobile for as long as possible, or rather, as we initially will have no choice, but this idea. Can it work? After you dig out the dirt, wouldn't the cement crack? I read the wire mesh part, but in many ways, this concept could be combined with so many other concepts, like a haybail shelter, later covered with mesh & cement, or even a Teepee, any shape at hand, filled with sand even (easier to dig out later), or an igloo, filled with snow that for now would eventually melt or a pile or old cans, instead of sending them to the recyling center. I mean the present technology uses a balloon. Just how strong does the form have to be I am wondering out loud?

Deb

This a very viable idea. If you have sense enough to store your bags of cement in some sort of protection to keep them dry, then they will be dry. If you have energy and help enough, you can mix this stuff by hand. This is also a very good idea if you build a small one now to survive in during the pole shift. I drove a cement mixer for a living and if you can drive to your survival site, so can the truck. If he mixes his cement so it is dry and not wet, you can spread your concrete by hand for your survival dome. Just make sure the truck driver is the only one you tell where it is. Cover your dome with dirt when it dries. That will give a little extra thermal insulation and help camouflage your location from the little powers that be.

The only problem I can see with this idea, and ugly is not it, is that with all the different stuff in the concrete, it has no connectivity. There would be too many places for the concrete to crack and break. As with wire mess and rebar, the concrete stays together. A good way to explain this would be to lace both your hands together with your fingers. Your hands are locked. But, lay one hand on top the other and they are not. I for one would not like to see a piece of concrete break loose and fall on one of my kids during an earthquake. I think it would lose structural integrity with too much junk in the concrete.

Clipper

They are selling portable washers in *Heartland America* catalogs and an amish catalog that I can't remember the name of. It turns over and over and over (we bought one).

John

*American Survival Guid*e did an article a couple of months back on this same construction technique. Had some cool pictures and other references.

Mike

Troubled Times

Background

After watching the discussion about concrete domes, I thought I might offer a construction design that might have some value in meeting the needs described. As background experience, preliminary to the design discussion, I offer the following: I worked my way through college; a significant part of it being construction work, where I observed iron rebar being wired to hardware cloth and other rebar to reinforce the concrete that was then poured over it. I have since then read a lot about construction; took community college CE courses on passive-solar/high tech home construction. I moved into a rural area 16 years ago, sensing impending changes in future times.

At this setting, I have designed and helped build a passive-solar, semi-earth-integrated home; have built two pole (out-) buildings and an office. The office is two buildings: a small passive solar reception and media therapy building and a geodesic dome; both on heavily reinforced foundations. (The office was built to serve as a small counseling/retreat center, with the whole facility intended as an example to the local community of the simple, close-to-nature lifestyle essential for harmony and survival here.) I have had higher guidance all along (don't feel safe to discuss details here and now) in this, and a design keeps coming up that might be of relevance to this discussion, so I'll share it here.

Please understand that the above details were provided so you will have a sense, also, of the *limitations* of my knowledge. I am a counselor, by formal training. Sorry, my graphics capability is down while I struggle with this glitchy software, so I cannot draw any of this. Hopefully you can visualize it. Also, some steps are not overly detailed, as some understanding of construction methods is assumed. A small, low-profile, monolithic dome (12 to 20 ft diameter), of ferro-cement is suggested as a strong structure that might hold-up to the types of changes you are describing.

Offered by **Anonymous**.

Troubled Times

Level Land

Establish a level and clear area for the dome. Sandy soil, rather than rocky is best as rocky substrate will transmit ground-shock more intensely. (For my office-dome, I removed some of the hard-pan and brought in a fine sand to put under the foundation so it could absorb shock better than the hardpan. There is building literature pertaining to these principles.) Drive a stake at the center point and attach a non-stretching line to a nail in the top of the stake. The line will have another scouring pin or stake at the free end, with the length of the line being equal to the desired radius of the dome.

Beginning at a point at the length of the line (the radius) from the central stake, scratch or scour a line around the full circle the full distance from the center stake. When you are done at this point, you will have a center stake with a circle around it demarking the perimeter of the dome. Since lines in the sand are unstable, drive vertical stakes in the ground, perhaps 18" apart, to a uniform height equal to the desired height of the monolithic slab you will pour (at least 4" to 6"). These stakes need to be strong and deep, as they will brace the concrete form, and they need to be at the same level.

Troubled Times

Footing

Begin by digging a round trench (12" to 18" wide) for the footing, using building codes applicable to the area. Be careful not to displace the perimeter stakes. (Note: Consider the possible climate change that would require deeper, below-freeze-level footings. Frozen soil heaves shallow footings.) Place horizontal rebar (perhaps ½" diameter, inner and outer ring) around the circumference of trench, inside, and heavy hardware cloth (4" to 6 " steel mesh) across the dome floor area. It is a good idea to first put a layer of sand, followed by plastic vapor-barrier under the hardware cloth. The forms, following the outer circumference of the trench should be installed (minimum 4". Pref. 6" high) for a monolithic slab that will encompass both the footing area and slab/floor area.

This concrete form can be done by attaching (tack and glue) long strips of layered ¼" inch exterior plywood (double or triple-band) to the inside of the large number of stakes around the outer circumference of the trench, at the same desired height above ground, making sure everything is level. The narrow (4" or 6" wide) strips will bend around the circumference of the stake circle. When you are done, you will have a plywood band circle around the outer rim of the footing trench, reinforced and secured to the inside of the perimeter stakes. It is a good idea, at this point, to "backfill" and pack soil around the outer rim of the band-form, as concrete is very heavy! Use water, if possible, to pack the soil. Bring the reinforcing soil almost to the top rim of the band-form.

Troubled Times

Rebar Holes

You will now "stick a ring" of vertical rebar lengths around the perimeter of the trench (either 18" or 24" apart: equal distance spacing, even numbers opposite-spacing), placing these "sticks" 3" inside the outer rim of the trench. This ring of vertical rebar "sticks" will, thus, circle the inside of the circular trench, 3" in from the outer rim. However, a gap will be left of 2 ½ to 3 feet, somewhere on the perimeter, which will serve as the future door. On either side of the "door gap" place a tight triangle of vertical rebars (3) spaced 6" apart.

Note: these will be long lengths of rebar, so pilot holes can be driven by taking a pipe of the same diameter, or slightly more, of about 4 foot length and starting the holes by driving pipe into the ground the same depth and removing it. You will then be able to insert the long rebars more easily. The lengths of the rebars must be long enough to extend into the ground below footing level deep-enough to hold them vertical, plus enough uniform length for bending along height-equivalent of dome wall to overlap one foot with adjoining rebar on opposite end. When you are done with this phase, you will see a ring of rebar "sticks" sticking up vertical from around the inside of the circular trench, with the exception of the future door area.

Troubled Times

Concrete Requirements

At this stage, you will calculate the amount of concrete needed to fill the circular trench/footing and the monolithic slab that rises above it. Order 2,000 psi concrete mix (strong concrete) from a reputable dealer to deliver the concrete pour. To assure uniform height of the pour, stakes can be driven inside the circle to the same height as the perimeter stakes. (Remove the stakes as you do the finish work.) Have some help, and some rented finishing tools to make the pour. You will begin the pour, filling up the trench first, keeping the rebars vertical (plumb); then filling the floor.

Work from the side opposite the future door, toward the future door, so you will be able to exit without tracking through your finish work. (You should consult a manual/article on finishing concrete before this ... it's not really difficult.) When you are done with this stage, you will see a round slab of concrete that has a ring of vertical lengths of rebar running around the perimeter, 3" in from the edge. These "sticks" of rebar will be even in number, so that each stick has an opposite: making a pair. (The exception will be the triangle placement of three rebars at each side of the future door.) They will be bent into place to form the "wall" of the dome.

Troubled Times

Floor Plan

The dome we are talking about will not be high, as a high profile (e.g. like half a baseball) will offer more resistance to airflow and be a larger target. We are talking about something more disk-like, on the order of 1/3 baseball slice, with no riser-walls. You will make a "half-arch" template, or jig, out of a material strong-enough to allow you to bend the rebar around it. Make your measurements and calculations carefully, to suit your purposes! You may want to be able to stand erect and walk around inside most of your dome.

Remember, we are talking about an all purpose survival dome and human den . ... kind of like a low-profile super-igloo! This is a place to cuddle, be warm and safe and sleep; not a place to have company over for dinner (at least not in large numbers). Small structures are cheaper to build, are stronger, are less visible, etc.. It should be able to take strong impact, resist water and minimize materials used in construction. Also, a lower profile will have another critical advantage to be discussed later.

This jig, or template, will look like an "L", with an arc running from the top leg of the L to the lower leg. (Another way to visualize this is to imagine a circle; then draw a vertical line through the center, followed by a horizontal line 1/3 of the way down from the top. The shape of the jig will be a top "quadrant" of the circle.) This can be made of a number of materials; including piecing ½" plywood, cut-to-shape, and bordered at the arc-edges by short sections of glued/tacked 1X4 or plywood. The idea is to create a "channel" over the course of the arc, which will allow you to bend the rebar to the shape of the arc, as follows:

Troubled Times

Jig & Plumb

This will require two to three people. Find the exact center of the circle-slab. Place the finished jig so that the exact edge (centered) of the vertical base of the "L" is right on the center dot of the circle. The horizontal leg of the jig should be the length from the center of the circle to the vertical rebar, or (to be precise) the distance of the perimeter minus 3", minus the diameter of the rebar.

With a little help from your friends, you will hold the jig plumb/vertical at the center of the circle, with the horizontal jig-leg butting against a vertical rebar. Bend the rebar over and along the arc-channel toward the center of the circle until the end is overlapping the center point. Then, move the jig to the exact opposite rebar, position it as before and bend it toward the center of the circle until the end is overlapping the center point and the other rebar. Wire the two rebars together where they overlap.

Continue clockwise around the circle, bending each rebar, then its opposite, in turn; then wiring, until you have done all the rebar. As you join the bars in the center, you will notice some congestion. Simply overlap and underlap, wiring them as you go. It does not have to be perfect. For now, leave the two extra rebars on either side of the door alone. When you finish this stage, you will have the shape of a dome skeleton! Ideally, you can weld the connections at the top for extra strength.

Troubled Times

Rebars

Now, beginning 18" to 24" off the slab level, you will run rebars horizontally around the circumference of the dome at that level. Begin by tying an end with wire (And/or welding) and work the rebar clockwise around the circle until you return to the beginning. Do the same every 18" to 24" up the dome until you reach the top. At this point, you will have a better idea of the shape of the dome.

Take the remaining four rebars (two on each side of the door) and bend them in a smaller arch, crossing them over each other at the top, in front of, and just above your desired door height. This is hard to visualize, except to say you will create a skeleton/frame for an arch in front of the door similar to the arch over an igloo door. Looking down from the top, you will see two "x's", one in front of the other, that frame-out the arch. Stick the ends of the rebar in the ground (Ideally, you can pour a separate, smaller footing). Use one horizontal run, at least, in connecting the door-arch with the dome horizontals.

I know this is somewhat vague without a drawing, but the general idea, here, is to create an arch over the door for protection from rain. The door should be low, requiring a human to bow somewhat in order to enter. (Smaller doors are safer and promote greater structural integrity.) Wire all connection points where rebars cross (or weld).

Troubled Times

Chicken Wire

The type of construction used here is called ferro-cementing. It is a combination of applying a special mix of concrete over a web-work of steel, to a thickness of 2" to 3," to create a very strong shell. Believe it or not, there is a tradition of constructing ship-hulls using ferro-cement, as it is very durable and the hulls stand-up to wave-action and oceanic stresses.

At this stage, you will take patches of hardware cloth (Heavy-duty chicken wire is fine for this) to wind and wrap around and over your re-bar dome-frame, wiring the material firmly to the frame at all locations. (Use steel wire; not copper for all of this. Where possible, use galvanized material.) It would be advisable to wire-in the hardware cloth from both the outside and the inside of the dome-frame. When you are finished, you will have density of meshing that will take and hold your ferro-cement plaster mix.

Troubled Times

Ventilation

Ventilation will be important, though I wouldn't advise windows for a structure like this. I would suggest one or more 6" to 8" PVC pipe elbows, fitted into the mesh (Elbows pointing down) at about one foot above ground level. At least one PVC roof-vent fitting should be located near the top of the dome. (The combination will allow for interior circulation via convection.) Plan vent sealing and filtering fittings according to your anticipated needs.

Also, at this time, fittings can be welded to the top of the frame to allow for later attachment of hardware of the type mentioned in the earlier attached correspondence. Also, other openings can be attached for later adjustable passive-solar heating venting, wiring, antennas, etc. … keeping in mind that every opening potentially weakens the structure and allows for intrusion of external elements. All openings should be seal-able.

Troubled Times

Cement

Mix batches of ferro-cement in recommended concentrations, such that you can plaster each batch on before it begins to set up. (Never add water to "re-constitute" partially-set mix.) Begin on the inside, at the top and work down, troweling on the plaster mix firmly-enough so that it squishes up between all of the nooks and crannies of the mesh. (However, be careful to avoid pushing lumps up beyond the outer layer of mesh on the outside. Trowel down anything that squeezes up.) Keep a "wet edge," preferably having one person mix while another trowels. This will add to the strength and integrity of the building.

When you are done with the inner level of plastering, allow it to cure before you begin the outer layer. The interior should be finished smooth. Depending on how it applies, it may be necessary to add a later, finish, coat. It may take some days to get a good start on curing, and the curing plaster should be kept damp and not allowed to freeze. This wait is not ideal in terms of bonding both layers, but it will be necessary for you to go onto the roof to do the outer layer and you don't want to be climbing on newly set plaster.

If you are concerned about the time between applying both layers, there is a bonding mix that can be purchased in home-improvement centers. Mix it according to instructions and apply before doing the outer layer. Remember, you want to leave enough depth of meshing to firmly secure the outer layer of ferro-cement plaster. Do the outer layer by starting at the bottom and working yourself around the dome in a spiral to the top. (By reversing the application sequence, as recommended, it is more likely that any water intrusion will tend to work itself back out toward the surface, rather than filtering to the interior.) Since all traces of wire and re-bar should be hidden, it may be necessary to put a finish-coat on the top.

Troubled Times

Seals

There are various ways of sealing this small dome. You can buy a surface-bonding cement, like Sure-Wall Surface Bonding cement, structural grade, and apply a sealing coat. There are various other sealers on the market that can seal your dome. I recommend, also, that you have plenty of heavy-duty plastic (black and clear) on hand for major changes. This material can be draped more-easily over a low-profile dome to seal it in the event of some cracking. (It also seals openings to broken glass windows, etc.)

Plenty of high-grade silicone sealant is good to have on hand. Upon completing the plastering, you will have a very strong structure … strong-enough to allow back-fill of a layer of soil for additional protection. This monolithic structure should have a thick bead of silicone caulk around the outer and inner joint where the dome meets the slab. Caulk also around all pipes, vents, etc.. It goes without saying how strong this integrated structure will be as the dome walls tie directly into the monolithic footing/slab.

Troubled Times

Insulation

Insulation should be a considered factor – especially if it gets really cold! Domes of similar construction often are constructed by using a fan to blow-up an envelope, which is used for blowing-on concrete mix, doing re-bar reinforcement, etc., including blowing on a layer of chemical insulation. Chemical insulations typically melt in intense heat (some can burn) and give off extremely toxic fumes. For this reason, I did not recommend interior insulation.

Exterior insulation is better for two reasons. First, the thermal mass (all that heavy concrete and steel) is on the inside of the structure; thus allowing for greater temperature stability due to temperature fly-wheel effect. Second, exterior insulation can be added later, as indicated. Natural materials can be piled better over a low-profile dome without sliding off. Soil is a fair insulator. A layer of plastic sheeting can be applied, then a layer of natural insulator (preferably low-flammability), another layer of plastic sheeting, then soil. This dome can even be built in a shallow depression and be back-filled over.

Troubled Times

Utilities

I leave it to you to add the details. Bomb-shelter technology (filters, running water pumps and air venting by bicycle peddling, etc.) can be used in this structure. It can be built over a long time without significant degradation of materials for less money and labor than what would be required by many of the other designs discussed. This design is wonderful as a meditation room or little kiva and such usage would do best to set the stage, vibes-wise, for a hide-out in troubled times!

Troubled Times

Donut Concept

A dome is optimal but a regular man could probably make a stronger torus than a dome, and faster. It's possible to make a collapsable tent that folds out into a torus but I haven't made one yet. The same principles I had in mind might apply:

- be able to build most of it in small parts and assemble quickly on site, because if you spend a long time on a hefty shelter then decide you have to leave or move for other reasons, you wasted a lot of time.
- must be easy enough to build, but also be able to withstand enormous weather and fireproof.

Donuts could be fitted inside each other, and have the added benefit of privacy. (One person can't see the other person in the other side of the donut.) If you could build one light, but strong enough then you could get some big guys to help you *roll* your house to a new location. Just turn it up on it's side and roll it. If it can be taken apart you could rebuild the donut *around* a large tree - you might swing around a little but you don't have to worry about sliding or rolling away. In a field you could fasten the donut to the ground somehow, and build a fire in the middle hole that could warm the whole place. As long as the dome was fire-resistant. Of course it could be designed to make full use of the hole for heating purposes. You would want the door small, but maybe 2 doors--one on the inside and one on the outside. Probably would hafta be round and just big enough to crawl into.

We need ideas for materials or construction methods that a cheapskate like myself can get. Also remember that you can build a big torus out of smaller ones, and in turn build the smaller ones out of smaller ones still. You could fashion tires into a large skinny torus, and then fashion those into one really homongous donut house. But then it might catch on fire easily. I'm going to work on some more models soon. Keep you posted.

Joe

I had this idea of rolling a donut house a few months ago, but it's just incredibly weird if you think about it! It's also quite logical if you're willing to challenge your paradigms which is happening a lot for me recently. Is there such a thing as a light weight plaster of paris?

John

Troubled Times

Construction

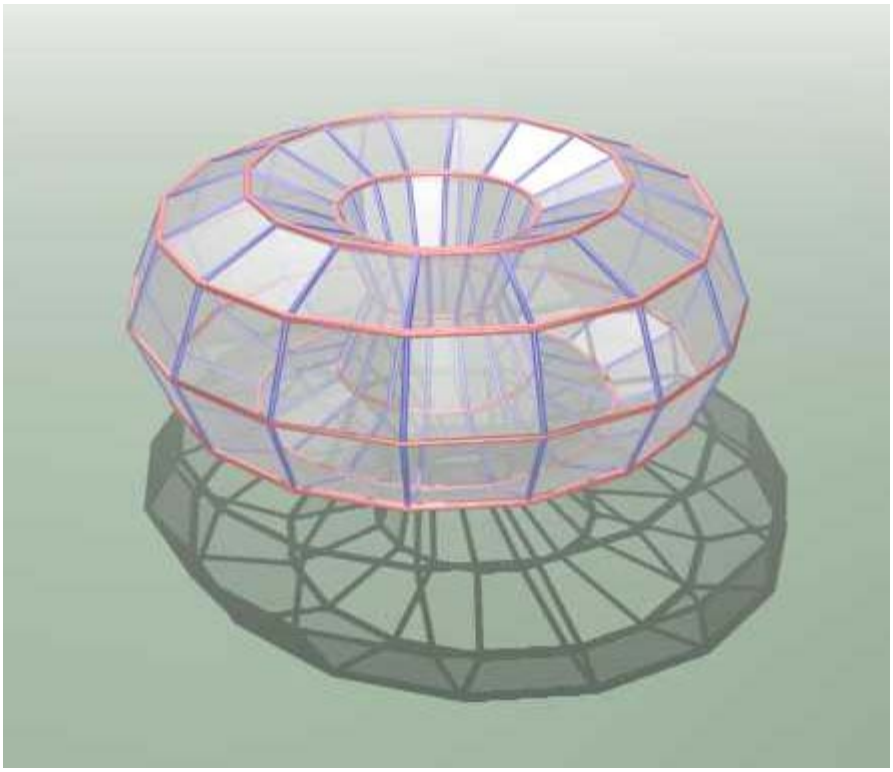
Why Torus

A torus might be a better shape for a homemade shelter than a dome. While a large concrete dome with a steel framework might be nice, it might be hard to make also.

How to make

A torus has most of the strength of a dome, but with more flexible contrsuction possibilities. A couple of ideas:

- Using 4 huge concrete or metal 'elbows', bolt together a torus. Water seal the whole thing somehow. Probably very expensive, and heavy.
- Loop together 8 steel pipes with heavy rope or cable into a circle. Make 16 total. This forms the longitude. For the latitude, make 8 more circles in the correct sizes needed. The following picture shows the longitude in blue, and the latitude in red

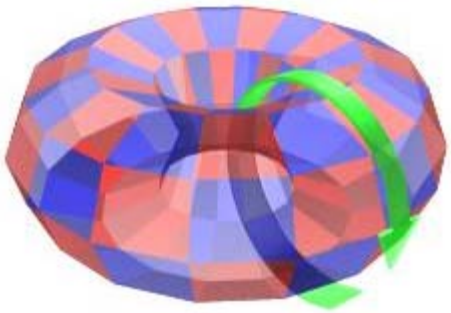


It would be best to figure out all the exact lengths of pipe needed beforehand. I'll come up with some measurements soon. Now you have 24 circles total. All you have to do now is tie them all together tightly, probably with big wraps of binding wire at each vertex.

Waterproofing

Once the framework is done, take some cellophane wrap (heavy kind, skid-wrap. Kitchen cellophane would work but you'll need a lot more. Skid-wrap comes in large rolls, used in factories etc.) Wrap it around the torus framework as much as you can. Use a lot and wrap it up tight. Wrap vertically, as shown in this picture. Many cellophane layers should provide very nice insulation properties, as there will be a small layer of air between

each layer of cellophane. This should waterproof it pretty good, except for one problem.



The Door

The door presents a significant problem, because all your waterproofing efforts are nil without a waterproof door. There's not easy answer, but I would only use one 'facet' of the torus as the door, so you don't break the framework. The door should probably be a large screw-on cap or something, so it won't leak as much. Placing the door on the side might be a good idea too.

Finishing

A cellophane-covered torus obviously won't cut it--it must be covered with something tough. You could cover the whole thing with dirt, or dump concrete over the whole thing. If using concrete you should make a circular pool of concrete on the ground as big as the torus, then set the torus in it. Then pour concrete over the top. That way all sides of the torus are coated, including the bottom. Make sure there's no holes in your cellophane, but if you wrapped enough it should be *hard* to poke holes in it. If covering with dirt, you'd better wrap it with something else after using *lots* of cellophane. You really need to coat it with something hard like concrete so animals don't burrow in. You might want air circulation so you don't suffocate, have fun figuring out that one.

Other Possible Benefits

If the middle is left hollow, you could climb on top the the torus, and throw flammables in it. You could heat the shelter from the inside-out this way without smoking everyone out. Maybe put a smoke-flap on top so the rain don't snuff out your fire. People could have a little more privacy in a torus, since one side is hidden from the other. You can expand a torus, just by adding more toruses around it. Or design it like that in the first place. You can build one around a lone tree so it don't go nowhere.

Offered by **Joe**.

PS: I tried to be clear in the descriptions, if not don't hesitate to ask. I'll be working on models, so please offer suggestions, even if they sound stupid. Stupid ideas are usually the best ones. And no, spraying styrofoam or InstaPak on the outside isn't a stupid idea. Neither is the pink-panther insulation stuff, you can sandwich that between 2 layers of heavy cellophane before concreting. Anything goes.

The Hub

Troubled Times

Models

The torus (donut) model I've been building our of string & straws doesn't work. The donut idea should be alright but not the way I was thinking about it. I did, on the other hand, build a geodesic dome the same way and it hold together very nicely. Even though it's made from cheap flimsy straws and twine of lackluster strength, it takes quite a lot of pressure to cause the top to cave in. Wrapping each vertex with multiple wraps of string in different directions would increase the strength quite a lot. My thought is that the greater the density of the framework (more sticks but smaller) the less imperfect the dome will be. The straws model is a little crooked looking, but it's pretty close.

I'm stuck even more on the "ropes & pipes" way of building the shelter because:

- The dome becomes self-arranging. All you need is the correct measurements of pipes. *No* angles to calculate and measure. For a decent lower-density dome, all you need is 65 sticks, 30 of which are 92.9% the size of the rest.
- Materials are readily available. Steel fencepoles (which are also fairly cheap) would probably work, or any other kind of tube if it's strong enough. You can string the thing together with chains, or nylon rope, or steel cable, etc. No bolts, nails, or other small items.
- Altough it's not a super-accurate dome, who cares. While super-accuracy probably means more strength, it's close enough, even without reinforcing the corners it will still stand on it's own. You could even weld the thing together when you're done.
- You can build it top-down, and raise it up as you go.
- You can easily connect several together.
- You can store the materials and get crackin' when the time is right so you don't lose your job for being "crazy" or lose friends.

Once I build 2 more models out of more realistic materials, I'll post webpages explaining how to make the dome from 65 pipes, then another one of higher density once I figure that out. The goal is to make it as easy as possible so the most people can benefit from it. The framework is the hardest part, then you can cover it with whatever you got.

Offered by **Joe**.

Troubled Times

Framework

I think the donut shape is an excellent idea. However, I think the best way to make it is with large prefabricated pipes. For example 8-20 ft diameter corrugated drainage pipes. If one took 5-10 or more and made a donut shape. Cutting and welding bolting the ends together. Then use stiff smaller pipes for spokes like a crude overly strong wagon wheel. The final wheel shape is built flat on the ground maybe 1/4 to 1/2 under ground with extra dirt piled on each side to help deflect flying objects. It should be made strong enough so it can still slide around without tarring apart if hit by an extreme jolt. High Winds would be unlikely to tip it over. Buying and transportation of the pipes to the site should not raises any big issues - for it looks like you just have a big drainage problem. Learning how to weld is not that hard.

Offered by **Mike**.

Using drainage pipes would seem impossible for most people. Welding requires lots of power, especially if you're going to try to weld something that large. This is why I'm going for a more primitive approach--I want something that can be made without power, rather like a indian teepee but covered in dirt, and/or junk. I'm really wanting to get away from concrete as an answer too, because of the large amount needed and high expense. It's not hard to get now, but later it might be. Making a torus from culverts is cool though, since the heavier and more redundant it is the better. What about using 4 concrete elbows? Where would you get those and the corrugated drain pipes from?

Another option with the torus is to design it to *float*, like an innertube. The culvert torus would probably float without a base; a concrete one might not. A sphere will float, and can be kept upright a number of ways. The idea is that if (when?) a flood came, you might be better above the water then below it. So a large, sturdy, land based torus building that will magically float if immersed might be a good thing to work on also. Would be very hard to test in real life, unfortunately, requiring accurate models to be built and tested. (and hope for the best)

Offered by **Joe**.

Local concrete supply places or possibly your Department of Transportation would be a good place to start asking questions about where to get them.

Offered by **Clipper**.

Troubled Times

Not Concrete

Joe, you really should look into ferrocement as a design option. Steel reinforcement bar is comparatively inexpensive and easy to shape for framing and so is the galvanized "chicken wire" mesh used to "wrap" the frame. You then use little cement, as it is stuccoed onto both sides (inner and outer) of the layers of mesh and frame. Many ship hulls have been made using this sturdy, thin-shell concrete method of construction, as it is much cheaper than steel. Find the Concrete Dome instructions for detailed instructions. This design is already there for you. Built properly, will be earthquake, wind and falling-tree resistant. It won't float, however. Consider building it on higher ground.

Offered by **Granville**.

I'm really wanting to get away from concrete as an answer too, because of the large amount needed and high expense.

Offered by **Joe**.

Why Gunite? Why not take the simplest, economical approach? After you apply enough layers of mesh, you trowel the mixture on with a hand trowel, keeping a wet edge. First trowel from the inside, then the outside. Skip the plastic tarp, which would weaken the structure. If you doubt these methods, I suggest you look up ferro-cement under the heading of ship-building.

Offered by **Granville**.

Troubled Times

Question

I've had a few difficulties making really clear CS. The first time I made it, it was really clear, even when I brewed it to the color of Miller Lite beer (I am a bartender, so I know exactly the color of Lite draft.). After that time though, the batches kept getting a cloudy yellow. Will that hurt me if I drink it? Is there a limit to the number of times an electrode can be used? I used a 27 volt generator for the first few batches. Then tried a 36 volt generator with new electrodes when I kept getting the cloudy solution. I nuke distilled water to get it hot, then keep it hot throughout the process on a coffee maker. I use 8 gauge .999 fine silver wire with about 4 1/2 inches of it in the distilled water.

My house is on piers, and walking around will agitate the water enough to knock off silver oxide pieces. Also, I used a center off polarity reverse switch. Nearly every time I switch it, small black flakes fall into the solution. Is that normal? Is that because the current is off briefly, or am I supposed to switch it before the fuzz gets any thickness to it? I' ve read of some people's batches actually forming bridges and shorting out the process. So far I' ve just filtered the clear batches through coffee filters and drank it anyway. I thought the cloudy solutions would be good for topical uses. When the electrodes get black, I remove them and wipe them with a clean paper towel, taking care to not touch any part of the electrode that will be close to the water. Is there any reason you can think of for my solution to come out cloudy?

I've also noticed that in certain glasses I pour it into, it changes color after several hours, going from yellow to rust to brown to black. Everything I use to make and store CS I clean with soap and water then rinse with water and then rinse with distilled water.

Dobie

Troubled Times

Answer 1

Were the new electrodes the same as the old? Also experiment with doing a batch, one with the 27 volt generator and one with the 36 volt generator. It may be that the extra voltage is causing the reaction you see. You do not need to do the process as long with a higher voltage. Check the Colloidal Silver Topic on Troubled Times for more information. I'd say switch it before it gets fuzzy. I have a unit I made myself which is really primitive with no bells or whistles. I have to manually switch the clips on the electrodes when I get a buildup. I never managed to generate a clear solution and have always let it sit for about 24 hours to let the larger particles fallout. Then I siphon off the "clear" solution (light to golden yellow) into amber bottles. I only make 8 oz batches at a time.

Over-processing and not switching the polarity will cause heavy silver oxide buildup. This you don't want. There is no need to filter your clear solutions. It is best to let the solutions rest then carefully siphon them out. The best thing to do about the electrodes is to not let the silver oxide build up, also, make sure the electrodes are evenly spaced from each other about 1 to 2 inches. Experiment with the spacing to see which produces the least amount of buildup. As far as why your solution is cloudy, it could be (1) you're using a higher voltage and may be processing too long, (2) excessive heating of the water which speeds up the process, (3) and/or make sure the new electrodes are of the same quality silver. Make note which glasses cause the CS to turn black and don't use them anymore! I use a clear 12 oz glass beer stein. Also, never ever use metallic utensils in your solution. It will affect the electrical charge and cause the silver to fall out of the solution.

Pat

Troubled Times

Answer 2

We all get the same thing - different colors depending on the temperature, length of time in process, quality of the distilled water, Spacing of electrodes, and voltage used. There may be other factors also. You can use an electrode until it disappears or dissolves and falls off. This is providing you have pure silver and not something that is silver plated. I believe the cloudiness in your case is just more silver, or longer processing. Just let it sit overnight and pore off the top after a few days if you are worried. If you try to use normal tap water then you will get some really cloudy mix that you will not want to drink. Otherwise if there is no chlorine in solution and you are using the best distilled water you can find, this would be the lowest resistance using an ohm meter, then you are probably fine and have normal silver solution like the rest of us. I have let it run at times until it gets greyish black, filtered it, and let it set and used it. Different temperatures give different results. This could be the major factor in your case. You don't need to keep the process warm; once the process starts, you don't need the heat. You may want to get a laser pointer to see how many particles you are putting into solution. The more the beam is stopped the more PPM in the solution.

Mike

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Sources

Hurricane Frequencies

(Unless otherwise noted, times are UTC, freq in kHz)
revised September 1, 1996

The following high-frequency hurricane season intercepts have been gleaned from numerous sources. Times and frequencies are subject to frequent change, and are listed for reference only. This list has been published monthly during hurricane season since 1991. If you copy this list, credit the authors. Do not remove update request and e-mail addresses. This is the only way we can keep the list updated! Thank you all who have so generously contributed information. You really can help keep this list current by sharing your additions, corrections and deletions. Cite source and include detailed info. Submit to either of the following:

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Hurricane Season

Frequencies of interest During Hurricane Season

03357.0 FAX Pictures from NAM Norfolk (continuous)
03407.0 USB National Hurricane Center air-gnd "ALPHA"
04271.0 FAX Pictures from CFH Halifax (continuous)
04426.0 USB USCG wx NMN Portsmouth (0400 0530 1000)
04724.0 USB Hurricane hunter acft - GHFS
05211.0 USB SHARES - FEMA National Emergency Coordination Net (night pri)
05562.0 USB National Hurricane Center air-gnd "BRAVO"
05610.0 USB National Hurricane Center air-gnd "CHARLIE"
06496.4 FAX Pictures from CFH Halifax (continuous)
06501.0 USB USCG wx NMN Portsmouth (0400 0530 1000 1130 1600 2200 2330)
06673.0 USB National Hurricane Center air-gnd "DELTA"
06739.0 USB Hurricane hunter acft - GHFS guarded by MacDill & Ascension
07507.0 USB USN/USCG hurricane net (pri)
07508.5 USB FAA Caribbean hurricane net
08764.0 USB USCG wx NMN Portsmouth (0400 0530 1000 1130 1600 1730 2200 2300)
08876.0 USB National Hurricane Center air-gnd "ECHO"
08968.0 USB Hurricane hunter acft - GHFS
08992.0 USB Hurricane hunter acft - GHFS guarded by MacDill & Ascension
09380.0 USB USN/USCG hurricane net (sec)
10015.0 USB National Hurricane Center air-gnd "FOXTROT"
10493.0 USB SHARES - FEMA National Emergency Coordination Net (day pri)
10536.0 FAX Pictures from CFH Halifax (continuous)
10865.0 FAX Pictures from NAM Norfolk (continuous)
11175.0 USB Hurricane hunter acft - GHFS guarded by MacDill & Ascension
13089.0 USB USCG wx NMN Portsmouth (1130 1600 1730 2200 2330)
13200.0 USB Hurricane hunter acft - GHFS
13267.0 USB National Hurricane Center air-gnd "GOLF"
13510.0 USB Pictures from CFH Halifax (1000-2200)
15016.0 USB Hurricane hunter acft - GHFS guarded by MacDill & Ascension
17314.0 USB USCG wx from NMN Portsmouth (1730)
17901.0 USB National Hurricane Center air-gnd "HOTEL"
17976.0 USB Hurricane hunter acft - GHFS
21937.0 USB National Hurricane Center air-gnd "INDIA"

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Amateur

Amateur High-Frequency Emergency Hurricane Nets

01984.0 LSB Virgin Islands (Virgin Islands, Puerto Rico, Lesser Antilles)
03808.0 LSB Caribbean Wx (1030)
03815.0 LSB Antigua/Antilles
03815.0 LSB Inter-island (continuous watch)
03845.0 LSB Gulf Coast West Hurricane
03862.5 LSB Mississippi Traffic
03873.0 LSB Central Gulf Coast Hurricane
03873.0 LSB Texas Traffic
03905.0 LSB Pacific ARES (Hawaii)
03907.0 LSB Carolina Coast Emergency
03910.0 LSB Mississippi ARES
03910.0 LSB Virginia Emergency, Alpha
03915.0 LSB Louisiana Emergency
03915.0 LSB North Carolina
03915.0 LSB Massachusetts/Rhode Island Emergency
03917.0 LSB Eastern Pennsylvania Emergency
03923.0 LSB Mississippi ARES
03923.0 LSB North Carolina Emergency (Tar Heel)
03925.0 LSB Central Gulf Coast Hurricane
03925.0 LSB New York State Emergency
03925.0 LSB Louisiana Emergency (altn)
03925.0 LSB Southwest Traffic (altn)
03935.0 LSB Belize
03935.0 LSB Central Gulf Coast Hurricane
03940.0 LSB Southern Florda Emergency
03947.0 LSB Virginia Emergency, Bravo
03950.0 LSB Northern Florida Emergency
03955.0 LSB South Texas Emergency
03960.0 LSB North East Coast Hurricane
03965.0 LSB Alabama Emergency (altn)
03967.0 LSB Gulf Coast (outgoing traffic)
03975.0 LSB Georgia ARES
03975.0 LSB Texas RACES
03987.5 LSB Mexican National
03993.5 LSB Gulf Coast Health & Welfare
03993.5 LSB South Carolina Emergency
03995.0 LSB Gulf Coast Wx
07165.0 LSB Antigua/Antilles
07165.0 LSB Inter-island 40-meter (continuous watch)
07225.0 LSB Central Gulf Coast Hurricane
07230.0 LSB Southwest Traffic
07232.0 LSB South Carolina Emergency

07232.0 LSB North Carolina Emergency (Tar Heel) (altn)
07235.0 LSB Louisiana Emergency
07235.0 LSB Baja
07235.0 LSB Central Gulf Coast Hurricane
07240.0 LSB Texas Emergency
07243.0 LSB Alabama Emergency
07243.0 LSB South Carolina Emergency
07245.0 LSB Southern Louisiana
07247.0 LSB Southern Florida Emergency (altn)
07247.5 LSB Northern Florida Emergency (altn)
07248.0 LSB Texas RACES
07250.0 LSB Belize
07250.0 LSB Texas Emergency
07254.0 LSB Northern Florida Emergency
07260.0 LSB Gulf Coast West Hurricane
07264.0 LSB Gulf Coast Health & Welfare
07268.0 LSB W273.0 LSB Texas Traffic
07275.0 LSB Georgia ARES
07280.0 LSB NTS Region 5
07280.0 LSB Louisiana Emergency (altn)
07283.0 LSB Gulf Coast (outgoing only)
07290.0 LSB Central Gulf Coast Hurricane
07290.0 LSB Gulf Coast Wx
07290.0 LSB Hawaii Emergency
07290.0 LSB Traffic
14185.0 USB Caribbean Emergency
14200.0 USB (Please advise)
14215.0 USB Pacific Inter-island
14222.0 USB Health & welfare
14245.0 USB Health & welfare
14268.0 USB United Nations Radio Readiness Network
14275.0 USB Bermuda
14275.0 USB International Amateur Radio Net
14283.0 USB Caribus Health & Welfare
14300.0 USB Intercontinental Traffic and Maritime Mobile Service
14303.0 USB Atlantic Region Traffic (Health & welfare)
14316.0 USB Health & Welfare
14325.0 USB Hurricane Watch (Amateur-to-Natl Hurricane Center)
14340.0 USB Louisiana (1900)
14340.0 USB California-Hawaii
21310.0 USB Health & welfare (Spanish)
21390.0 USB Inter-Americas Health & Welfare
21400.0 USB Transatlantic Maritime
28450.0 USB Health & welfare (Spanish)

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Global

On **US Global High Frequency System** (GHFS) frequencies. Best frequencies to monitor are those guarded by MacDill and Ascension. After initial contact on one of the published GHFS frequencies, listen closely for them to switch to a non-published frequency to pass traffic. Aircraft call signs are "GULL-nn" or "TEAL-nn" (where nn is a 2-digit number), "NOAA-42", "NOAA-43 and "NOAA-49". The GULL and TEAL aircraft are based at Keesler AFB, Biloxi, MS. The NOAA aircraft are based at MacDill AFB, Tampa, FL.

Whenever a hurricane is within 300 miles of land in the northern western hemisphere, the **Hurricane Watch Net** is operational on 14325. The Hurricane Watch Net provides communication between the National Hurricane Center and the affected areas.

During a communications emergency, **W1AW** transmits special bulletins by voice at hh:00, teleprinter at hh:15, and CW at hh:30. Frequencies are:

Voice	01855 03990 07290 14290 18160 21390 28590
Teleprinter	03625 07095 14095 18102.5 21095 28095
CW	01818 03581.5 07047.5 14047.5 18097.5 21067.5 28067.5

The **National Institute of Standards and Technology** broadcasts storm warnings on 2.5, 5, 10, 15 & 20 MHz AM according to the following schedule:

WV hh:08	Covers Atlantic and eastern North Pacific
WWVH hh:48	Covers Western, Eastern, Southern, and North Pacific

Globe Wireless broadcasts weather information, forecasts and bulletins in CW and SITOR modes on the following time-slot schedule:

Stations ..

WNU	New Orleans, Louisiana
VCT	Tors Cove, Newfoundland
KFS	Palo Alto, California

Frequencies ..

WNU FEC:	04210.5 06327.0 08425.5 12588.5 12607.5 16384.5
VCT FEC:	04217.5 06329.5 08422.0 12610.5 16827.5
KFS FEC:	04211.5 06315.5 08417.5 12580.5 16829.5 22377.5
WNU CW:	00478.0 04310.0 08570.0 12826.5 17117.6 22575.5
KFS CW:	00476.0 08558.4 12844.5 17026.0 22581.5

FEC Product & Transmission Times ..

WNU: GOM/CARIB/ATL CYCLO BULL 0220 0520 0820 1120 1420 1720 2020 2320

GOM/CARIB OFFSHORE FCST 0350 0950 1550 2150
VCT: N ATL HIGH SEAS WX 0450 1050 1650 2250
KFS: E & CTL PAC CYCLO BULL 0220 0520 0820 1120 1420 1720 2020 2320
PAC HIGH SEAS WX 0450 1050 1650 2250

CW Product & Transmission Times ...
WNU: GOM/CARIB/N ATL HSEAS WX 0350 0950 1550 2150
KFS: PACIFIC H SEAS WX 0450 1050 1650 2250

Notes:

1. Offset tune 2.2 kHz for FEC broadcasts in FSK or LSB
2. Normal hurricane season extends 01 June to 30 November

Links to a wide array of current technical hurricane information and data can be found at **Eric Blake's Atlantic Tropical Weather Center** page located at http://banzai.neosoft.com/citylink/blake/tropical.html. Products include weather forecasts, hurricane reconnaissance flight data, satellite weather images, and more.

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Big Welcome

I had an interesting experience I thought I would share. I went out to our local ham radio club meeting because I was interested in trying finally to get my license. It was so cool ... it is the last bastion for nerds left! It was really neat, they were very friendly, and had the neatest infrastructure in the form of repeaters, nationwide message traffic networks already in place and working, and technical expertise.

This club partners up new hams with old hams and it is the old guys job to make sure that the new person is enabled to get their license. They also have a twelve week course that will get you ready to take the exam. It was so neat I just thought that I would share it with you all. Anyone out there who wants to get their license, find your national agency for hams at www.arl.org or www.rac.ca and then your local club. They are so happy to see young blood. They don't want to see their bands taken over by the government and made into cell phone bands or some such I expect.

Offered by **Gus**.

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Preparation

I just started to prepare for my HAM license also. There are two programs available on the net. NU-Morse and NU-Test which will help you prepare for the various elements of the exam. They can be found on the web at http://www.btinternet.com/~tony.lacy/ and registration for both is about $49.00. Although it is no longer required to have Morse code skills to acquire a license (Technicians No Code), you will need to know code to acquire the other license levels. I believe it will be one of the most valuable skills to have in preparation for coming events. Morse Code is capable of reaching distance's much further than any other transmission. Requires less power for transmission and is a Universal language.

NU-Morse can train you to send and receive Morse code up to 48 WPM. When preparing for the Morse code exam don't study for the 5 WPM test. Start out with 20 WPM and work your way up from there. The average transmission speed of Morse code in the real world is 18-30 WPM. If you train your ear for 5 WPM you will have to relearn the entire code because there is a world of a difference between the sounds of the transmissions. It must become a reflex action when sending and receiving to attain the proper speeds. Past methods of teaching have created many frustrated applicants who have been unable to go above the 5 - 10 WPM levels. Start off with 2 random characters at 20 WPM and work up from there. Before long you will be able to handle full transmissions at normal speeds as your ear and mind become familiar with the tone of the transmissions.

Offered by **Vince**.

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Encouragement

I was interested in your letter concerning ham radio. I have my license, but have actually never done anything with it. I guess the problem was that once I got it, I was too nervous to get on the air. The reason I was so interested in your letter was that I decided that I should change this, purchase some equipment and force myself to speak out on the air! Of course, purchasing equipment means getting out there and earning money to pay for it, and I'm really going to make the effort this year to do that. Maybe by that time you will have your license and I can talk to you, get started that way.

Offered by **Helena**.

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On the Air

I don't know what the radio group is doing yet but, the obvious thing to do would be to set up a traffic network or something with the hams on the page. I met some old guys last night who are code operators and they are involved in something called the CanadaNET which is pool of code and voice operators that know how to pass message traffic back and forth across the country on the ham bands. The whole object of this is to keep a pool of competent code users around in case of emergencies. Apparently during the Los Angeles earthquake the continent wide network, I don't know it is called was instrumental in getting communications going.

I am going to take the course offered by the ham club, because there I can meet other people and get involved with them. How many hams are on the list? Maybe they could try broadcasting something and we can see if we can hear it on softwave, it might be an interesting experiment.

Offered by **Gus**.