DC Diesel Furnace:

Eberspacher 12VDC

Operations:

1. Remove chimney cap from exterior hull port side (use a quarter or large screwdriver)
2. Ensure furnace fuel valve near top of port tank is open
3. Set the thermostat for approx 23 degrees centigrade
4. Turn on switch forward port side pilothouse - from large black circle, clockwise one notch to large orange circle.
5. This is the full speed setting. One more notch clockwise to the small orange circle is half speed
6. To secure, turn knob counterclockwise to the large black circle and replace chimney cap. Do not over-tighten.

Oct-09	varnished hallway walls with Schooner Satin, trimmed with gloss, replaced hallway headliner with wainscoting plywood, painted with Interlux Brightside primer, then several coats of white.	
10/2009	primed pilothouse and galley ceilings and galley bulkheads with Zinsser primer, painted with two+ coats of Behr elastomeric paint. Stretchy paint on padded vinyl - needed to use utility razor knife to separate tape from paint.	
2-Nov-09	Tommy, from Gulf Coast Marine (Electrical) aboard. See the "Tommy GCM" tab for his findings and recommendations.	Tommy, Gulf Coast Marine, Ft Myers Beach
Nov-09	primed and painted padded vinyl outboard stateroom bulkheads - same paint as above	
11/4/2009	Polished port fuel for 12 hours. Gauge still running at 10+. Will still change element, but needed to polish fuel.	
11/4/2009	Ran generator for 30 minutes under load (15-20A AC). Tommy from Gulf Coast Marine (NL/Lugger Service) advises doing this at least monthly.	
11/4/2009	From now on, leaving shorepower-driven charger on all the time to keep batteries topped off while at dock.	
Nov-09	varnished pilothouse walls, floors and trim (except ceiling beams) with Interlux Schooner Satin, highlighting with High Gloss (grab rails, major beams, trim, etc.)	
Nov-09	varnished trim on bulkheads and doors in entire interior with Schooner High Gloss	
Nov-09	used wire wheel on grinder to polish tarnish off hooks/retainers to hold doors open (companionway, screen door, head, stateroom), as well as dorade and hawse-hole plates, polished with Flitz, sprayed with two+ coats of lacquer.	
11/14/2009	washed and chamois'd dry entire boat.	
11/16/2009	Tommy from GCME combined the two deep cycle house banks into one large bank and added a dedicated starting battery, all charged by onboard inverter/charger or alternator/regulator. Added galvanic isolator to isolate difference between dock ground and ship's ground (bonding system). Added engine room switch and wired generator oil pressure and water temp gauges.	
12/18/2009	Ran generator for 25 minutes under load (10-12A AC) as part of my monthly schedule (GEH = 299.2 - 299.7. Temp & PSI normal.	
12/18/2009	Ran engine for 20 minutes. Temp & PSI normal. Tachs didn't work for a time. Reving engine would shoot the needle up to a high RPM, but then would immediately drop back to 0 RPM (dead). Stayed there for a few minutes, then started working. Alternator appeared to be charging the entire time at 14+ volts with charge light on remote panel. REMEMBER TO SWITCH TO BATTERY TWO (ONLY) TO START !!!!!!	

12/20/2009	Polished port fuel for 12 hours. Gauge running at slightly under 8 on the F1 filter manifold (almost new filter element). Need to order more elements from Gulf Coast Filters.	
1/3/2010	Polished starboard fuel for 12 hours.	
1/3/2010	Ran diesel furnace for an hour. Documented operational steps and added to the specs page of the ship's log.	
1/3/2010	Ran generator and engine for 30 minutes.	
1/20/2010	Ran generator and engine for 30 minutes.	GEH = 299.7 -> 300.3 EH = 1180.7 -> 1181.3
1/22/2010	After sanding coach roof trim with 80 grit on a long board, then 180 and 220 grit on a padded sanding block, applied two coats of Epifanes varnish, 24 hours apart, diluted approx 20% with Epifanes thinner.	
1/23/2010	Replaced bow thruster zinc as it was about 70% gone (per Rob of Underwater Works). Other zincs all ok.	Still have one more spare on board (stbd lazarette - outboard shelves).
1/24/2010	Consistent slight list to starboard (water in stbd tank, none in port). Transferred 3" of fuel from stbd to port fuel tank (approx 14 gal = approx 112 pounds). Very windy, not sure if that did the trick or not.	
1/25/2010	3rd coat of Epifanes on coachroof trim	
1/27/2010	Tommy from Gulf Coast Marine finished up today. He re-hooked the sensing wires from the (now dedicated starting) battery 2. This enables the amps and Ahs to once again be observed for this (new) battery on the Heart Interface remote panel in the pilothouse. He had disconnected this because of his concerns about starting the engine THROUGH the shunt for this interface, and that we would exceed the capacity of this shunt. After realizing that I had been doing this successfully for fifteen seasons, Tommy agreed with Ray that this was an acceptable risk. If the shunt SHOULD fail (engine fails to start), move battery two's ground cable from the bottom half of the shunt (battery side) to the top half (load side) to bypass. Shunt is located on the forward bulkhead of the engine room just to port of the ladder hatch.	Tommy, Gulf Coast Marine, Ft Myers Beach
1/27/2010	4th coat of Epifanes to coachroof trim. Continued burning varnish off cockpit rails.	

Ship's Underway Log 2009

*FOCTS = satisfactory check of fuel, oil, coolant, transmission fluid & strainer

Date			Source to Destination	Mile #	Locks	Daily Miles	Total Miles	Eng. Hours	Eng. Time	Eng. Total	Latitude	Longitude	Remarks
5/9/2009			Move boat from Burnt Store Marina (BSM) to Charlotte Harbor Boat Storage (CHBS) in Placida, Florida, which is the host location for the Star Boat Shop		1	24		1168.8	3.8				Boat in Star Boat Shop at Charlotte Harbor Boat Storage for deck and hull repair (wet core on side decks, under windows and both sides of mast (foredeck), hairline crack repair on rub rails on hull sides, repaint. Multiple groundings (nothing abrupt) going into the eight mile fresh water canal system. On the depth meter, saw as little as 4.2' of water in several places. Some groundings (mud) were hard enough to have to power through. After boat pulled from water, no evidence of moisture barrier damage, only anti-fouling paint rubbed off.
9/15/2009			Move boat from CHBS to BSM (home port)		1	24		1172.5	3.7				Boat repairs and painting complete. Moving back to Burnt Store Marina for further restoration (interior varnish and exterior brightwork). Underway amperage: batt 1 - 6.3A; batt 2 - 9.5A with chart plotter and autopilot on (water dead calm). Riding with ebbing tidal current. Engine oil pressure: 49 PSI, temp 182 degrees at 1575 RPM w/ 7.7 knots SOG. Newly packed stuffing box leaking steady dribble. Tightened to 2 drops per second at 1,000 RPM. Need to tighten (compress) ten rings of GO fiber packing further. After groundings going into CHBS, and having prop reconditioned, seems to be a bit more vibration visible at the stuffing box than before. Need to have shaft alignment rechecked (was good to 0.004" in MN). On trip home, batteries continued to charge ('accept'). Didn't get to 'float'. Ran the generator for about 15 minutes, flushing with canal fresh water. Batteries resting after docked: batt 1 - 12.6V; batt 2 - 12.65V

Date			Source to Destination	Mile #	Locks	Daily Miles	Total Miles	Eng. Hours	Eng. Time	Eng. Total	Latitude	Longitude	Remarks
11/14/2009			Ran engine for 30 minutes, exercised transmission			0		1172.9					FOCTS* ok, although oil looked maybe 1/2 quart low.
11/19/2009			Added 50 gallons water to starboard tank (crossover open) plus 16 oz. Peroxide										

Date	Start Time	Stop Time	Location	Marker	Locks	Daily Miles	Total Miles	Eng. Hours	Eng. Time	Eng. Total	Latitude	Longitude	Remarks
11/20/2009	1445	1707	West of Useppa Island off ICW		-						N26 39.397	W082 12.953	Shaft and box cool to the touch u/w. Not leaking. Oil 50 psi, water 180, 1725 rpm, 6.5-6.9 kts, running with ebbing tidal current, winds NNW 10 kts, light chop on CH, course 248M. Entered ICW at Boca Grande Pass at '76' at 1625. Anchor down at 1707 in 10.9'. Deployed 90' chain (5.3:1 scope) to 55# Delta.Marked anchorage as "0184" on GPS.

11/20/2009	1930	2030	Ran generator	293.1	1	After running frig, microwave, a few AC lights and DC anchor light, batt sw on 1 (house), saw (-15/-19AH). Didn't expect to see batt 2 discharging. Started gen with only batt (house) 1 charging, sw 1. In 60 minutes, saw -3/-3AH). With sw 1, saw -1.6/-1.7A & 13.25/13.5VDC)
11/21/2009	0630					Batt readings (after 10 hrs): -34/-38AH, -3.1/-3.0A, 12.30/12.95VDC - still on sw 1. After brewing coffee (78A for 2:15), etc. Observed code on Heart = 39A79 on batt1.
11/21/2009	0655	0910	Ran generator	294.1	2.3	Charger + water heater = 28A = ~3,360W. OK. Current draw while brewing coffee does NOT show up on Heart with gen on - gen drawing the load, not the batts. Batt readings: -37/-42AH) at 0655, -10/-7AH at 0910. Shut down gen at 296.3 GEH. **Disconnect batt2 pos lead & Heart still shows -2.9/-4.7A draw!** Then also disconnect batt2 sensing wire & Heart still shows -2.8/-4.7A with batt sw '1'. Now "E-13 error msg flashing on Heart. Observed that after disconnecting batt2, electrical panel gooseneck light (cig lighter socket) doesn't work - hard-wired to batt2. Other? Flipped to batt1 for anchoring ops (per GCME direction)
11/21/2009	1755	1948	Ran generator			GEH 296.3 - 298.3, (-38/-39AH -> -16/-11AH)
11/21/2009	1950		Generator secured			After running gen for 2 hours, batt sw 1, reading -16/-11AH
11/22/2009	0740		Battery readings on sw 1			-57/-55AH (the SUM is about what's expected for running ship's anchoring ops the entire night)
11/23/2009			new battery/wiring problem			per Tommy at GCME, he thinks he missed a sensing wire (black) that might still be on one of the original deep cycle (house) banks (the red wire only sends VOLTAGE reading to the Heart remote interface. It's the black sensing wire that measures the current delta between battery and shunt). He believes that the draw being sensed is actually still the sum of the old double house banks on the Heart (1+2=total draw from the deep cycles when switch is on '1" (house), and NOT drawing from the starting battery ('2'). He'll talk with Ray and confirm before getting back to me later this morning.
11/23/2009			new battery/wiring solution			the reading on bank 1 of the Heart remote interface is reading the correct voltage, total amp consumption and total amp-hours drawdown of the (now single) house bank. The reading on bank 2 of the Heart I/f is reading the correct voltage of the starting battery (batt2), but NOT the correct amps or amp-hours. This would necessitate starting the engine through the sensitive (500A) shunt and would theoretically burn it up (this was rectified on 1/27/2010 - see equip/mach log). Besides, Tommy says what's to watch on the starting battery other than the voltage since its supposed to always be charged by the alternator each time after the brief starting cycle. Solution: disconnect the two current sensing wires for house bank 2 (which no longer exists) from the load (starboard) side of the shunt (on the forward bulkhead of the engine room), including the small brown wire (was attached to the top of the shunt) and the small yellow wire (bottom), and just tape off (abandon). After 1/27, and these wires reconnected, all seems to work just fine (as it had for well over a decade!), Tommy's worries notwithstanding.

Maintenance Intervals on Sojourn

Updated November 2009

Maintenance Item	Scheduled Maintenance Interval	Prescribed Replacement Interval & Baseline Event
Engine:		
Engine oil	200 hours or annually	Rotella T 30W
Injector pump oil	50 hours or annually	Rotella T 30W
Flush engine coolant	3 years	Fleetgard Extended Service (blue) pre-mixed 50/50 with Ionized Water
Replace transmission cooler	1200 hours	(new 8/2008 at 824.8 EH)
Transmission oil	annually	
Replace oil cooler	1200 hours	(new 8/2008 at 824.8 EH)
Replace heat exchanger	2000 hours	(original equipment at 0.0 EH)
Replace engine impeller	3 years	(new 8/2008 at 824.8 EH)
Engine water pump wear plate and cover plate	3 years	?
Generator:		
Oil		Rotella T 30W
Generator water pump wear plate and cover plate	? (see genset manual)	
Flush generator coolant	3 years	Fleetgard Extended Service (blue) pre-mixed 50/50 with Ionized Water
Replace generator impeller		?
Fuel:		
Replace primary fuel filter element	8 to 15" of Mercury on vacuum gauge	new 10/2008
Replace fuel polishing filter element	3 to 5" of Mercury on vacuum gauge	
Hull:		
Haul-out	every other year	hauled out 2009
Replace hull zincs	as needed (every 3 months in BSM?)	new zincs 2009
Refresh bottom paint	every other year when boat is pulled	freshening coats (two) of bottom paint 6/2009
Service thru-hulls	every other year when boat is pulled	done 2009

Service transducers	every other year when boat is pulled	done 2009

Topsides:

303 Protectant every two weeks to all plastic or vinyl (ship's name on boom, plastic blocks on mast, rope clutch handles, window gutters, running lights, masthead transducers, windlass deck switches, mast wiring hose, etc.)		
Wash boat at least weekly	Awlgrip Boat Wash	mix capful of AwlCare polymer sealer into wash monthly
AwlCare Sealer bi-monthly	use dinghy to get at hullsides	
Teak oil (at least two coats) at least quarterly (rub rails, swim platform, deck blocks)	new 9/2009 (six coats)	
Exterior brightwork	annually	

Dinghy:

Run engine for 15 minutes monthly (at least)
Flush engine with fresh water after salt water use whenever possible.
Apply 303 Protectant to entire topsides at least monthly
Inspect for gel coat repairs needed interior deck & hull.

Next Event Required Schedule

replace at 2000 EH

replace at 2000 EH
replace at 2000 EH

new 8/2008 - replace
by 8/2011

Fuel Log M/S Sojourn

From: 02/22/09 To:

Date	Time	Boat's Location	Timer Setting	Polish Stbd Fuel	Polish Port Fuel	Filter Used	Start Fuel Level	End Fuel Level	Battery Bank Used	Current Draw	Start Battery AH Reading	End Battery AH	Vacuum Reading	Purchase Fuel	Purchase Cost	Comments
02/22/2009	0745	BSM	12 Hrs		X	F1	16.5”		2	1.2 A	-0 AH		4.5	-	-	Below 70 degree air temp, mod. Humidity
			Note:													
11/18/2009	noon	BSM	12 Hrs	X		F1	?		Shorepower charging	n/a	n/a	n/a	10	-	-	Last operation with old F1 element
11/18/2009	noon	BSM	12 Hrs		X	F1	15		Shorepower charging	n/a	n/a	n/a	8+	-	-	First operation with new F1 element

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Changing F1 Filter

Need on hand: a clean bucket, plastic cup, absorbant pad, adjustable wrench, F1 filter element, small waste basket, 2 plastic bags with draw strings

Time needed for procedure: 20 minutes

New element reads 8 to 8.5 on vacuum gauge upon initialization of first polishing operation (wait for air to be purged from new element before taking reading).

Old element read 10, but still worked fine, and did not appear to be soiled on visual inspection

Procedure:

Isolate filter enclosure from the rest of the system (close valves 1, 2, 3, 15 & 16)

Remove safety drain plug at bottom with adjustable wrench

Carefully remove enclosure lid to facilitate draining fuel from enclosure and set aside where it will not get dirty

Remove floorboard beneath drain to increase working room and place fuel absorbant pad beneath drain

Prepare waste basket by lining it with two layers of plastic trash bags with drawstrings (one inside the other, inside the waste basket).

Place plastic cup underneath drain and open drain valve slowly

Once cup is near full, close valve and discard the first cup of fuel (could contain some water and sediment) into the plastic tras bag in the waste basket prepared in step 5, being careful not to drip any fuel elsewhere. The remaining fuel will be transferred from the enclosure's drain valve into the clean bucket. Repeat approximately ten to eleven times until no more fuel out of drain valve

Once enclosure is empty of fuel, close drain valve and remove two wing nuts on sides to allow enclosure to tilt forward at a for five degree angle. Set wing nuts carefully aside as they'll be needed again to resecure enclosure when finished. Tilt enclosure slowly forward to extent of retaining chain. Hang onto it as it will naturally be top-heavy and will want to tip forward too fast.

Unscrew (counterclockwise) the spring-loaded retaining nut inside enclosure at top of filter element and carefully set aside where it will not get dirty

Remove the soiled filter element from enclosure. The top plastic frame may come out separately from the rest of the element. so, insert tips of fingers underneath top layer of element material (cloth) to facilitate SLOWLY pulling element free of enclosure

Carefully place soiled element into the bag-lined waste basket.

Remove new element from its plastic bag and insert slowly into empty enclosure over center threaded rod. Press firmly down t ensure element is seated on the bottom of the enclosure.

Screw top spring-loaded retaining nut onto the threaded center rod now protruding from center of new element

With enclosure still tilted forward, SLOWLY begin to pour fuel from the bucket back into the enclosure. Doing this slowly is necessary to provide time for fuel to soak into the absorbant element without overflowing the top lip of (tilted) enclosure. More fuel and less air in the enclosure when finished is better, and will be easier for the pump to purge the remaining air from the enclosure (and the lines between it and the destination tank). This operation is performed tilted to provide clearance for the bucket to be tipped up over enclosure. Discard the last several ounces of fuel into bag-lined waste basket (drizzle into top of soiled element) as there is likely sediment in those last few ounces.

When no more fuel can be poured into the enclosure (either bucket is empty or no more can be poured in without spilling over rub fuel onto surface of black o-ring recessed into enclosure lid and re-install lid by carefully threading T-handle lid onto centra threaded rod. Firmly hand-tighten lid onto enclosure. Do NOT use any tools. That would over-compress the o-ring and likely cause a leak under pressure.

Firmly tighten safety drain plug into drain valve. Do not over-tighten! In an emergency, it might be necessary to remove this dra plug without the benefit of tools!

Open valves that isolated this filter from the rest of the fuel system, but NOT valves to the engine or generator, and orient remaining valves to perform desired polishing operation, purging remaining air from the filter enclosure. See fuel polishing system operations manual for details.

Begin polishing operations to purge remaining air from enclosure and downstream lines (between enclosure and targeted fuel tank). This will also get this filter ready to serve as the backup underway fuel filter should the primary underway filter (Racor 50 become inoperable.

Category	Date	Work Item	Last Performed	Future Events Schedule

BATTERY TESTS

8/8/2008 Both house battery banks load tested - ok.

Battery Specific Gravity (checked with fluid hydrometer)

9/20/2009 (before EQ) w/ air temperature of 90 degrees:

	Battery	Cell 1	Cell 2	Cell 3		
Bank 1	1A	1255	1255	1265	all	"good"
	1B	1255	1255	1255	all	"good"
Bank 2	2A	1250	1260	1250	all	"good"
	2B	1255	**1230**	1250	one cell "fair"? (per guide on hydrometer)	

Prep for equalization:

1. Turn battery switch to bow battery to "off" (otherwise, gel cell would be over charged)
2. House battery switch to "both"
3. All D.C. breakers off (all D.C. equipment off to avoid potential high voltage damage)
5. Press "charge" on Link 2000-R
4. On Link 2000-R remote panel, setup mode, then hold voltage+amp-hour keys for 5 seconds
5. Charging light on Link 2000-R on and flashing during automatic 8 hour EQ cycle

9/21/2009 (after EQ) w/ air temp of 85 degrees:

is this hydrometer temp compensated? Find out!

Bank 1	1A	1255	1255	1260	the most water needed in cell 2 after equalization
	1B	1255	1255	1255	equal water refill needed for all 3 cells
Bank 2	2A	1265	1270	1255	most water needed in cell 2
	2B	1265	**1250**	1255	most water needed in cells 1 & 3

total water added after EQ (less than I had expected) was about a liter total)

I believe I have been undercharging the house batteries and not equalizing frequently enough. Fortunately, it appears no long term damage to these batteries from these marginal practices!

Battery facts:

Batteries last only 2/3 as long in hot climates as they do in cold climates

Per Nigel Calder,
If the battery has been used vigorously, it can take up to 24 hours for the electrolyte to stabilize (before testing should occur for accuracy)
Typical specific gravity readings vary by region:

North of Florida and Northern Europe:	1.265-1.280
Florida to San Juan, PR:	1.250-1.265
South of San Juan, PR	1.235-1.250

Always keep the plates covered in each filler cap with distilled water

If a wet cell is left uncharged for over a month, especially in summer months, self-discharge will lead to sulfation, the sulfates will harden, and the battery will be damaged permanently

A fully charged gel-cell can be left alone for several months

Wire Gauge Info: For battery connections, use marine tinned wire

Wire Gauge	**Diameter** (inches OD)	**Cost** (www.jamestowndistributors.com) as of October, 2009:		
		10 feet	25 feet	50 feet
6	0.38	$15	$38	$75
4	0.38	$22	$60	$110
2	0.45	$39	$91	$190
1	0.49	$44	$111	$221
1/0	0.63	$62	$158	$288
2/0	0.65	$69	$170	$340
3/0	0.71	$87	$214	$425

Current installation info: SOJOURN, Owner: Gene Jurrens 507-254-8480 or 941-575-9373

Vital Systems alternator - 120A, single pulley, installed circa 1994 (with Heart Interface), model = 23-566 or 23-5G6 or 23-SG6, sn = 150SCG or 130SCG or 1303CG or 1505CG (or some permutation thereof), "P" type external regulator (Heart Interface Ideal Regulator option), on Motorola style mount/tensioning bar, currently on port side of engine (nearest house banks). Asked Balmar for clarification on sn (necessary to order correct dual pulley kit). **What is belt width? 3/8" or 1/2"? Belt is 1/2"** per Bob Campbell, Annapolis, six diode alternator, suggests replacing with 155A, ganging house banks into one, separate small (automotive style) alternator with own starting battery to charge.

Desired:

separate starting battery (with dedicated smaller alternator just to charge starting battery?). Convert existing high output (130A) Vital Systems alternator from one pulley/belt to two pulleys/matched belts and mounted on engine opposite the Vital. Also want to combine two house banks into one larger bank, and optionally, automatically charge.

Want ability to use house batteries for emergency engine start should starter battery fail to do so

Want "Zap Stop" on alternators to protect from accidentally opening circuit between alternator output and battery (I.e., accidentally turning battery switch to (through) off while engine is running).

Questions:

Best to leave high output alternator where it is (to port near portside house batteries) and add new (smaller) starter battery alternator on starboard side? Possible?

See GCM answer on the "Tommy GCM" tab.

Today, we're starting engine from deep cycle house batteries. Not optimal per Bob Smith and Bob Campbell.

What's the difference between a battery combiner and a battery isolator? What do I need for one big bank composed of four 6VDC batteries?

See GCM answer on the "Tommy GCM" tab.

Is it better to leave the (3-stage) charger on all the time while sitting at the dock (which is most of the time when not on a cruise)? Does this tend to overcharge batteries, even with a (1994 vintage) "smart charger"?

Answer: yes

I'd like to install a dedicated starting battery (with its own alternator?) but still use the house batteries as an emergency backup for starting the engine. How do we do that?

See GCM answer on the "Tommy GCM" tab.

When charging house batteries, I've been putting the selector switch on "both". Is this not a good practice? (both banks are same type of battery and same vintage and I believe the battery isolator will prevent the weaker bank (2?) from drawing down the stronger bank (1?).

Answer: if batteries are same type and vintage, physical idiosyncrasies will cause this to happen. No big deal (until one or more cells go bad in the weaker bank - then issues develop).

Any problem having the shorepower charge on when starting the engine (and alternator automatically starts charging)? They say, seem to say "no problem" at http://www.yandina.com/combInfo.htm#Q19) on the question, "What happens if two alternators end up charging the same banks?"

Answer: No. The batteries will only take so much charge, no matter how many charging sources. It's OK.

Can we (should we) isolate starting battery with isolator (e.g., from house banks?)

See GCM answer on the "Tommy GCM" tab. Short answer: yes, best and simplest with mechanical switch.

Is isolator still working? Is it also relevant to non-alternator charging (I.e., shore power charging?)

Answer: the battery isolator currently installed is only there to prevent back flow into gel cell for bow thruster and windlass. Need to add a galvanic isolator immediately behind shore power connections to the boat (protect both 30A cords) to isolate boat's AC system from poor quality shorepower.

Burnt Store Marina admitted their shore power is "hot" (whatever that means) and other boaters report rapid deterioration of their zincs.

It would appear that I have a battery isolator and NOT a galvanic isolator? Can we confirm? Would galvanic isolator help with hot shorepower and rapid deterioration of zincs?

Answer: Yes, see above.

If we combine two house banks into single larger bank (good idea? Nigel Calder seems to think so), rewire with respect to isolator? If we do this, I'd want a disconnect switch for each bank in any event to isolate each bank to aid in monitoring for bad cells.

Answer: simpler if periodic hydrometer tests are done on each cell of each battery. Switches are extremely expensive at these amperages.

Why do lights on the Link 2000-R remote panel flash erratically when flushing electric head? Need some sort of isolation? (head installed in 2003).

Answer: See "Tommy GCM" tab. Short answer: the negative from toilet is connected to the battery side of the shunt for the Heart Interface, thus screwing up the sensed voltage to the interface. Move it to the load side of the shunt which should address the issue.

Could it be the shape of the genset's sine wave output causing an issue with A/C (particularly at startup of A/C)? (see Aug-08 log entry below). When running the A/C from generator power, sounds funny, but works.

Answer: If it works, don't fix it! Just use it.

Do zincs on outside of hull (I.e., rudder) that are not connected to boat's bonding system do any good? They don't seem to wear down like those that are bonded (transom, thruster). See May, 2009 entry below.

See GCM answer on the "Tommy GCM" tab.

Why does it appear that batt2 continues to be fed a +~1A charge even when battery switch is off and charger is off? Sounds like this might be normal for the Heart Interface equipment.

Answer: could be a set up parameter, or a fuse on a negative lead instead of a positive. Likely not a significant issue.

Is it better or worse for batts to leave 3 stage charger on all the time (float)? Does this boil off electrolyte, or is it better to keep batteries topped off all the time in this way? I don't smell any "off-gassing" when the charger is left on, but just need to know what the best operational practice might be. Or would it be better to leave the charger off when not (deep) cycling the battery (e.g., when the boat is just sitting at the dock with light load like the stereo) and then doing an overnight charge once a week or so?)

See above. Leave it on when connected to shorepower. When cruising, connect to shore power once a week or so on a deeply cycled vessel like Sojourn to top off the batteries

Electrical-relevant machinery log entries:

Apr-81	**Purchased new by Joe & Mary Thompson**
Apr-82	Installed Espar diesel heater
Apr-87	New mast, standing and running rigging ($15K) - mast, boom, Lewmar winch, Plastimo 1011 headsail furler, Windex, Tricolor, DataMarine wind machine.
Apr-88	Install A/C (17KBTU Rotary Air) - $1.7K
Nov-91	Install bow thruster - WesMar T8E 5HP electric $6K
Dec-91	Battery charger wiring replaced
Jan-92	Installed bow battery/wiring - Dekka 8G4D Dominator Gel, wiring, terminals;

Jun-92	New isolator wiring, replace isolator (Newmar 1-3-120A - continuous duty cycle rating to 50 degrees centigrade, temp rise to 95 degrees centrigrade at full rated current, voltage drop 0.7V at 50% & 0.9V at full load - isolates up to three batteries).
Aug-92	Engine hot (~190 degrees) - serviced engine & heat exchanger cleaned
Oct-92	Winterized, installed windlass (Lofrans Tigres), autopilot (Autohelm ST7000), generator (6KW Northern Lights Lugger),
Jul-93	engine/batteries checked - ok
Aug-93	Batteries serviced, thruster oil ok
Oct-93	engine & batteries checked - ok; filled batteries
Mar-95	Installed lightening prevention ($379)
May-95	Engine room rebuild & serviced sail furling system
Aug-95	Generator switch, bonding system, auxiliary electrical panel, winterize,
Sep-95	Purchased by 2nd (current) owners - Gene & Kay Jurrens
	Note: From 1995 to 2008, boat was meticulously winterized & stored out of the water on a custom storage cradle (with eight pedestals and pads) from early to mid October until mid to late April or early May each season in SE Minnesota.
Apr-96	Filled/charged house batteries and charged bow battery
Oct-96	Serviced and winterized engine/genset, filled/charged house batteries and charged bow battery in prep for winter storage (oct-apr). Batteries left in boat.
Apr-97	Filled/charged house batteries and charged bow battery
Oct-97	Serviced and winterized engine/genset, filled/charged house batteries and charged bow battery in prep for winter storage (oct-apr). Batteries left in boat.
Apr-98	Filled/charged house batteries and charged bow battery
Apr-98	New wiring in mast (large coax for VF, small coax for TV/stereo, masthead strobe/tricolor/anchor light, spreader lights, wind, steaming light)
Oct-98	Serviced and winterized engine/genset, filled/charged house batteries and charged bow battery in prep for winter storage (oct-apr). Batteries left in boat.
Apr-99	Filled/charged house batteries and charged bow battery
May-99	Sent Link2000-R, monitor board (pilothouse bulkhead) and regulator board (forward bulkhead in engine room) to Cruising Equipment Co. - diagnosed chip on regulator board power supply failed possibly due to nearby lightening strike (precedent); installed compression bars on stainless davits

Oct-99	Serviced and winterized engine/genset, filled/charged house batteries and charged bow battery in prep for winter storage (oct-apr). Batteries left in boat.
Apr-00	Filled/charged house batteries and charged bow battery
Jun-00	New fuses in generator (3) inside control box after overload; new pressure water pump (2.8gpm) - replaced old diaphragm pump with new centrifugal.
Oct-00	Serviced and winterized engine/genset, filled/charged house batteries and charged bow battery in prep for winter storage (oct-apr). Batteries left in boat.
Apr-01	Filled/charged house batteries and charged bow battery
Jul-01	Installed 12VDC light under bookshelves and galley shelves (lower). Wired to "Port" breaker on panel.
Oct-01	Serviced and winterized engine/genset, filled/charged house batteries and charged bow battery in prep for winter storage (oct-apr). Batteries left in boat.
Apr-02	Filled/charged house batteries and charged bow battery
Apr-02	Installed shaft zinc (1-2/3" close tolerance) inside boat (spare, plus keep propeller from hitting rudder if drivesaver blows).
Oct-02	Serviced and winterized engine/genset, filled/charged house batteries and charged bow battery in prep for winter storage (oct-apr). Batteries left in boat.
Apr-03	Filled/charged house batteries and charged bow battery
May-03	Installed new holding tank (28 gal.) and combo electric/manual head (both Raritan)
Jun-03	installed control head for tank (waste) monitor and head breaker for electric head (25A) in the head to complete wiring to main 12VDC buss bar on forward bulkhead of engine room.
Jul-03	Installed new holding tank sensors and wiring
Oct-03	Serviced and winterized engine/genset, filled/charged house batteries and charged bow battery in prep for winter storage (oct-apr). Batteries left in boat.
Apr-04	Filled/charged house batteries and charged bow battery
Aug-04	Replaced 17KBTU A/C unit (which was installed in 1988) with 18.5kBTU (Flagship Marine) and associated pump (500 GPH), and laid in the appropriate spare parts kit; prior to this replacement, we recall the A/C running fine from generator.
Oct-04	Serviced and winterized engine/genset, filled/charged house batteries and charged bow battery in prep for winter storage (oct-apr). Batteries left in boat.
Apr-05	Filled/charged house batteries and charged bow battery
Aug-05	New floor under house/starting batteries, new acid-proof battery boxes (Blue Sea Systems, ABYC compliant) w/ covers/dogs, new house batteries (Four Trojan T105s = 225AHx2). Batteries are 62 lbs x 4
Aug-05	Link2000-R dead: cracked fuse holder by batteries - replaced with waterproof fuse holder (inline); replaced fuel system with fuel transfer and polishing system - wired to battery bank two via breaker on auxiliary breaker panel on aft bulkhead of pilothouse.
Oct-05	Serviced and winterized engine/genset, filled/charged house batteries and charged bow battery in prep for winter storage (oct-apr). Batteries left in boat.
Apr-06	Filled/charged house batteries and charged bow battery

8/1/2006	Shore power cord meltdown (socket at boat) - replaced boat-side socket/connections
Oct-06	Serviced and winterized engine/genset, filled/charged house batteries and charged bow battery in prep for winter storage (oct-apr). Batteries left in boat.
Apr-07	Filled/charged house batteries and charged bow battery
May-07	Replaced genset's faulty DC regulator board (was not charging its starting battery); replaced genset's gel starting battery
Jun-07	Cleaned, rewired shower sump and forward bilge pump; replaced faulty motherboard on house inverter/charger (would not invert)
Aug-07	Removed bow thruster motor from boat (with boat in the water) and took it to a DC motor shop to have brushes replaced and motor reconditioned.
Oct-07	Filled/charged house batteries and charged bow battery before winter storage (oct-may). Batteries left in boat (winter temps as cold as 20 below zero at times, average 10 to 20 above zero)
Apr-08	Filled/charged house batteries and charged bow battery
May-08	Installed new 50/200khz bronze digital depth sounder transducer and new fairing block (18 degree deadrise, port side hull bottom).
Jun-08	Installed Garmin suite of electronics (12" touchscreen multi-functional display - chartplotter, GPS, color digital sonar, satellite weather/audio, 24nm radar) - purchased online from Hodges Electronics ($5K)
Jul-08	Upgraded Autohelm autopilot to latest version of RayMarine ST8002 SmartPilot autopilot control head & course computer (replacing ST7000 12V type 300 course computer) to work in conjunction with ST7000 below decks type 2 linear hydraulic drive; also associated instruments and transducers (ST60+ wind/close-hauled wind and Tri-Data--speed, depth, water temp, logs/timers). Also integrated with new Garmin instrument suite via NMEA 0183 interface. Purchased from Martronics ($5K). Certified RayMarine installer - also performed sea trial commissioning and calibrating.
Aug-08	Engine upgrades & maintenance: new vee-belt (non-standard length due to non-standard alternator/bracket), hoses, expansion tank, oil and transmission coolers, oil lines, adjusted valves, new gaskets, aligned shaft to within 0.004" (required moving engine to starboard and inserting a hardwood (teak) shim on port side between aft port engine mount and port hull stringer outboard of engine mount. Best worn quite a bit, so swapped in situ backup (unused but several years old) - used belt ok for emergency use, but not long haul. Changed engine raw water impeller - all in one piece, but quite badly 'weathered'. Drilled and epoxied limber hole in midship bilge (just forward of engine bilge) to facilitate drainage into main (aft) bilge when necessary. New galley faucet installed. Relocated stern light to radar mast. Changed ATF (transmission) fluid. Both house battery banks load tested - ok. Changed F1 fuel polishing filter.
Aug-08	Generator gen end checked out ok, although running a little hot on frequency (62 Hertz). A/C sounds funny when running on generator. Alan thinks generator is just marginally a bit small to run an 18.5KBTU A/C.
Oct-08	Engine overheated (>190 degrees) after increasing charge rate of alternator from 77A to 113A (it's a 120A alternator). Reset to 77A after anchoring. Also heard belt squeal when switching from one battery bank to two ("both"). Switched back to one, squeal stopped and engine temp descended to normal (~187 degrees). Later found belt loose and tightened. Dale Holst (mechanic, MN) advised that >55A with one belt/pulley usually not good on Lehman. Reset down to 55A (on Link2000-R remote). Engine ok
Nov-08	Arrived at Burnt Store Marina, Punta Gorda, FL - our destination and new home port for Sojourn. First time boat has been in salt water in fourteen years (previously east coast - Washington/Baltimore area).
Dec-08	Hired diver on monthly schedule. Rob cleaned hull, indicated zincs ok, but no bottom paint on aft 2/3 of keel (from numerous groundings on trip south)
Jan-09	Diver cleaned hull, indicated zincs ok

Feb-09	Diver cleaned hull, indicated zincs ok
Mar-09	Diver cleaned hull, indicated zincs ok, but some corrosion ("rust spots") on propeller. Questioned whether shaft zinc was doing its job. Removed, wire brushed shaft and zinc, reinstalled. Will check next month to see if the zinc is doing its job
Apr-09	Diver cleaned hull, indicated zincs doing their job, but getting consumed. Also indicated that it now appeared that shaft zinc is doing its job.
Mar-09	Checked engine zincs - ok. Had Joe (239-872-9623) check Dometic refrigerator/freezer - not sure 12VDC side was working. Checked out ok - said batteries not topped off and dropping below the minimum required 10.5V under load when frig compressor fires up. Charged batteries overnight (I don't like to leave charger on all the time - boils 'em off?).
5/25/2009	Boat out of the water (5/5/09 - 9/14/09) Installed **new zincs**: shaft collar C8 for 1-3/4" shaft ($20 - 3.3 lbs), Bow thruster zinc for WesMar Vortex propeller size B ($7 - 0.5 lbs), transom zinc DP-612 or DP-1 ($24 - 8 lbs), rudder anodes (2) slotted ZHC-5S ($28 X 2 - 9.2 lbs). Total $102 **(8.5 lbs bonded + 9.2 lbs not bonded**) , although rudder zincs are not connected to the boat's bonding system, and don't wear out as fast as shaft, thruster and transom. Allegedly, BSM "runs hot" (?) and has no plans to address the issue. Another boater in BSM reports that his zincs "just drip off the boat within about 3 months).
7/10/2009	Hooked up shore power & topped off batteries with water and charged overnight to "float". Re-zeroed A.H.s for both banks (batt2 had floated to a high number, even disconnected from shore power; batt1 appeared normal at near 9AH.
8/26/2009	Batts had been disconnected for >1 month (red 'hot' leads). Link2000-R remote still indicated batt2 creeped up to >+100AH (batt1 stayed at/near -0AH). After reconnecting both banks (before charging), batt1 read 12.05V, batt2 read 5.9V! After recharging overnight (8/26/09), AH readings were high (+40AH for batt1, +156AH for batt2). Reset both to 0AH.
9/5/2009	Charged batteries to float 9/5/09. Observed the following: Batt bank 1: resting at 12.45V. During 'charge' - 12.45-13.95V. During 'accept' - ~14.25V. During 'float' - 13.35V. Batt bank 2: resting at 12.2V. During 'charge' - ~13.2V. During 'accept' - 14.4V. During 'float' - 13.45V. AH reading continued into the positive. Started at -10AH on Link2000-R, and after a couple of hours, +65AH
9/13/2009	Measured several bonding system locations in engine room to check on solidity of bond. Criteria: <0.10Ω = ok. Measurements from bonding system buss bar near A/C pump in engine room aft, to: engine seacock: 0.05Ω, transmission cooler: 0.08Ω, heat exchanger: 0.06Ω, deckwash seacock: 0.03Ω, A/C seacock: 0.04Ω, starboard aft engine mount: 0.07Ω. Conclusion: ok, but probably time to refresh all connections and spray with Circuit Guard soon. Need to also check other locations (e.g., buss bar in midship bilge under hallway sole, forward in engine room, etc.)
9/15/2009	Underway amperage: batt 1 - 6.3A; batt 2 - 9.5A with chart plotter and autopilot on (water dead calm). Riding with ebbing tidal current. Engine oil pressure: 49 PSI, temp 182 degrees at 1575 RPM w/ 7.7 knots SOG. Newly packed stuffing box leaking steady dribble. Tightened to 2 drops per second at 1,000 RPM. Need to tighten (compress) ten rings of GO fiber packing further. After groundings going into CHBS, and having prop reconditioned, seems to be more vibration at the stuffing box than before. Need to have shaft alignment rechecked (was good to 0.004" in MN). On trip home, batteries continued to charge ('accept'). Didn't get to 'float'. Resting after docked: batt 1 - 12.6V; batt 2 - 12.65V
9/16/2009	Measured marina shorepower voltage and frequency at BSM = varied from 122.2 to123.3VAC @ 60.0 Hz; measured some DC loads aboard boat: chartplotter only (min. backlight) = 0.8A; with backlight on auto during bright daylight = 3.0A; satellite audio = 0.7A; radio (FM at mod. vol.) = 0.6A, CD = 0.6A;
9/20/2009	Checked house batteries' electrolyte - ok (not overly full). Checked specific gravity - all 12 cells checked out good at from 1250 to 1265, except one cell (battery 2B, cell 2) checked out "fair" at 1230. Started equalization process at 1500 hours. Aborted 1730 due to several power failures and lightening in immediate vicinity (of my boat load full of hydrogen gas).

9/21/2009	Battery equalization (EQ), that is, desulfation cycle started at 1430, complete at 2230. All cells now within the range of 1255 to 1270.
9/25/2009	Charged house banks overnight to float. AH readings of +18 and +43.
9/26/2009	Polished starboard fuel for twelve hours. Battery switch on "both". Drawing 0.5-0.6A from 1, and 0.4-0.5A from 2. Within 5 minutes of starting polishing, AH readings dropped to 0 and 0 (see yesterday's starting nums).
9/27/2009	Taped and primed padded vinyl areas of galley (ceiling, outboard bulkhead) and pilothouse (ceiling) with Zinsser primer (supposed to stick to anything). In preparation for final two to three coats of elastomeric paint.
9/27/2009	Polished port fuel for seven hours (was on a twelve hour cycle, but aborted as the vacuum gauge rose from 10 to 10.5 inches of Mercury since yesterday, indicating that the F1 filter element likely needs changing (recommended at 3 to 5 inches).
10/9/2009	Noticed that after a week of slight discharge, with battery switch on both, battery 2 draws several amps from battery 1.

PULLING MAST WIRES INTO THE BOAT (after mast has been removed and then restepped):

All connections are made below-decks for weather-proofing, at the strong suggestion of a rigger in Annapolis who prepared the boat for shipping in 1995. Wiring from mast enters the boat through a small waterproof connection in the foredeck on the tabernacle into the forward corner of the hallway ceiling. When drawing wires from topsides to down below, use a messenger line first sent through the hole taped to the VHF feedline (sans connector), and then use that messenger line to pull the rest of the wires, one at a time (didn't have to remove spade and ring terminals last time, although it was very snug).

Wires transit from the mast to the deck via a fitting on the back of the mast base that connects a 1.5" flexible hose to a stainless drip tube on deck. First pass the wires through the hose and then through the deck. This hose will be fixed in place with a stainless hose clamp at each end; thereby, weather-proofing these connections (key!).

This wiring is divided into three groups within a single harness:

1. The VHF radio antenna feedline (need to remove the PL-259 connector to get the cable through the hole when reconnecting the wiring after the mast has been removed and reinstalled,

2. The Autohelm (RayMarine) wind instrument shielded transducer cable (larger diameter black sheath)

3. Wiring for all the mast lights (tri-color, strobe, anchor & two spreader lights)

This harness must then be attached to the appropriate boat wiring that is fed to the same spot in the hallway via a surface mount teak channel that runs floor to ceiling on the port side of the hallway. This boat harness then leads to the appropriate breakers on the main electrical panel for lights and instruments.

There are two main junctions that connect groups 2 and three above to the boat's interior wiring:

1. A terminal box for the wind instrument wiring. The box contains a terminal strip that requires the boat wires on one side and the mast wires on the other. Color match the four signal wires and one ground (cable shield) wire.

2. A terminal strip for the mast lights. The legend for this strip is as follows (all wires are labeled with the appropriate number):

Terminal Strip Positions (connect all wires with the same number labels to each other on the respective positions this yellow strip as noted below):

1. Not applicable
2. (off strip collection of all ground wires labeled '2')
3. Strobe
4. Tri-color
5. Spreaders
6. Foredeck (steaming or bow light as it is labeled on the breaker panel)
7. Anchor
8. Bow light (how does this differ from foredeck? Hmmmm…) connected it anyway, and all lights work :-)

Cover with ceiling plate secured by four screws. Done!

Electronics & Appliance Draw: SOJOURN, BSM Slip J9

Owner: Gene Jurrens 507-254-8480 or 941-575-9373

Instrument or Appliance:	volts	amps	fuse / brkr
D.C.			
cabin lights (each)	12	1.4 (Sensibulb = 0.2 - 0.3)	
anchor light	12		
running lights	12		
electric fuel pump	12	1.1	
chart plotter/gps	12	0.6-1.0	
radar (standby)	12	1.4	
radar (transmit)		2.0-2.3	
sonar	12	0.5	
satellite weather/audio	12	0.1	
radio (standby)		0.2	
radio (sat audio)		0.6-0.8	
radio (CD)			
engine room monitor	12	0.2	
autopilot	12		
tridata (water temp, speed, log)	12		
wind speed & direction (real, apparent)	12		
diesel heater	12		
A/C heater	120		
inverter	12	2.5-3.0 (no load)	
TOTAL			
A.C.			
refrigerator (Dometic)	12/120		
coffee pot	120	85A / 2A	
A/C	120		
charger (heart)	120		
charger (bow)	120		
water heater	120		
blender	120		

comments
chartplotter backlight setting ranges from minimum to auto in bright daylight
radar current draw ranges from minimum on 1-2nm range to max on 16 nm (nonlinear)
radio current draw varies by volume (higher = greater draw0

Bob Smith's Pearls of Wisdom (MTOA 2008 Spring Rendezvous & Boat Inspection):

High pressure side of Lehman fuel system = 2700 psi
Vulnerability to air in fuel lines increases as fuel level in tanks goes down
Dirt goes through 2 micron secondaries - change periodically
Use 30 micron primary fuel filter element
MMO, or Marvel Mystery Oil, 1 quart per 100 gallons - lubes injectors, especially important with low sulfur fuel
Every 3 years, flush coolant
Water pump - replace wear plate and cover plate every 3 years
In transmission, watch out if fill level increases or fluid becomes red & milky (water leaking into transmission from leaky cooler
Every 1200 hours, replace transmission cooler
Every 2000 hours, replace heat exchanger
Change oil every 200 hours, injector oil every 50 hours.
Do oil analysis on engine AND transmission annually
Change impellers every three years

Specifically on Sojourn:

done	On throttle/shift controls, tighten all the way bottom screws.
	Lower the location of engine coolant recovery bottle (below pressurized fill cap) so you can check and add coolant in pressurized cap without overflow (should do the same for generator).
	Replacement for fresh water (coolant) air bleed petcock on top of manifold (port side) = 2J3 w/ 1/4" pipe thread. Order one.
	Prop should be 24 x 17 for this boat and 2:1 Paragon transmission (actual = 18 pitch currently, which might explain W.O.T. is only 2400, not the rated 2550)
done	Keep a machinery log
done	**Should be no zinc pencil in oil or transmission coolers** (only increases chances of getting zinc pieces in coolers, and the one in the heat exchanger is more than adequate).
	To both oil and transmission coolers, need to add ground straps to bonding system
no action	Transmission cooler installed backwards - zinc should be on outlet side, NOT inlet side! No problem if you remove zinc.
done	There's a brass screen in Walbro fuel polishing pump that isn't serviceable - bypass pump for normal engine ops and use only during polishing. A better pump would be Reverso bi-directional gear pump.
	Inspect raw water pump annually. Replace when ears are worn. You have a 3/4" barbed fitting to a 1" hose. Remove second hose clamp as it's only biting into the hose, not barbed fitting.
done	Replace fuel supply line! Appears imminent failure increasingly probable
fyi	**Sojourn's engine was manufactured late in the series of Dorset engines**
wip	**Get a two pulley kit, including matched belts, for Balmar alternator (approx. $150). Get slide arm for 2nd alternator dedicated to starting battery. Will likely need 2-3 inch pulleys**

Order from ADC:

alternator (internally regulated?)
swing arm mount (can mount on starboard side so near new starting battery?)
petcock for bleeding air from coolant (2J3 w/ 1/4" pipe thread)

ask:
size wire from starting battery to new alternator?
dual pulley/belts kit?

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Sojourn's high output alternator is mfg by Jim Maxwell of Vital Systems. It's a single pulley, 'P'-type, externally regulated, with s should always be derated by at least 20% (to <96A) in operation by using programmable controls of the Link 2000-R remote p much in order to quickly put a big charge back into discharged batteries. If running engine for much longer periods, however, t or 60A).

Bob performed the original installation (for the original owner, Joe Thompson) of the high output alternator, Heart Interface inv regulator that controls charging by the alternator.

Indicated that with a high output alternator that has only one pulley, should work fine AS LONG AS the belt is kept very tight (l pressure on longest run of belt). If the belt is "shiny", it is no good.

With a new belt, install and run under load (so alternator is charging heavily) for fifteen minutes (no more), then shut down and after one hour. This takes all the initial stretch out of the belt, and prevents "glazing".

Use Napa Auto Parts' premium belt (mfg. By Gates - best belts around). Use only cog belts.

To measure length of belt (need 1/2" or 12.5-13mm wide belt), position alternator closest to engine, then move out 1/3 of its a around the pulleys to measure outside circumference. Take measurement to Napa, and they'll use a conversion chart. Buy the exact length available, and record length and reference number for future reference.

Recommends converting two house banks into one bank (with where battery technology and knowledge is today).if adding a d discharge less deeply for a given period of time, and reduce number of cycles needed (that also use batteries up).

There is 550 degree grease in the front-end bearing of all alternators. Biggest enemy of alternators is heat. The more diodes i the better.

We should install a (new) high output alternator to starboard, where the engine's water pump is not in the loop, avoiding side-l put to use the large extra pulley on the front end of the Lehman 120HP engine at no extra charge (no need to have an extra pu alternator (big bucks!). So you can get away with a one pulley/belt system on a high output alternator, but must keep the (1/2") more than adequate. Needs full 180 degree belt wrap around pulley. Put new small automotive-style (55A) alternator to port. M the loop, and starting alternator stays close to starter's solenoid (less than 18 inches or so away).

For the (new) starting battery, we want the most CCAs (cold cranking amps) we can get in the size battery that will fit physicall (preferably) if there's room, or if not sufficient space for a 4D, as heavy duty a Group 31 as we can wedge in. Higher CCAs me cranking capability and capacity for short bursts that can quickly be recharged by a small automotive-style alternator. This is di deep cycle batteries which have thicker plates that cycle deeper for longer, but also take longer to charge back up - which is w our deep cycles to start the engine (a quick huge burst of energy drawn out of the battery(s) - wrong use of those batteries, an the system, i.e., more charging time, more generator time, more engine run time, etc.). Traditional CCAs are measured at zero degrees. Apples and oranges. Traditional CCAs typically a smaller number than marine CCAs for the same battery.

For keeping the starting battery charged, just need a small 55A automotive-style internally regulated alternator. Can get at Nap mount.

Then for new high output alternator to replace current one, recommends 155A single pulley to starboard on custom (dual foot) another customer's Lehman engine). Uses "bonus" (free) 7" pulley (sheave) on our engine's crankshaft. He'll have Jim at Vital should be able to get 105 to 120A effective output at IDLE! It will require a new custom mount, and Bob will fabricate one for n customer's Lehman (cost TBD).

We have the smartest regulator on the market (still)! It "knows" amps and amp-hours. Most on the market only know voltage a float light comes on that its going to the right float voltage (see documentation). The alternator turns off during "accept" stage, stage to keep a maintenance charge on the batteries. Automatically resets to zero AHs as soon as any load is placed on the b not gas (overcharge) the batteries. Infinitely better than chronically undercharging in any event.

Will need to move the blue wire from the (external) regulator to the new alternator when mounted to starboard. (needs female over to the new alternator.

For the new 55A alternator, the wire out of that alternator needs to run the 18" or so to the bolt on the starter solenoid.

Need to determine if larger diameter wire is needed with higher output (155A) alternator. (sent pics so Bob can evaluate)

Never discharge house batteries more than 50%. They'll then charge back up to 85% pretty quickly. Most cruisers live most of once a month (at least, more frequently is better), charge batteries back up to 100%. That last 15% (from 85 to 100) takes thre but is important for battery life.

Answers to my Questions by Tommy from Gulf Coast Marine, Ft Myers Beach, FL - aboard Sojourn 11/4/2009

He doesn't like battery isolators (0.8VDC voltage drop in each) or combiners (have solenoids prone to failure). Philosophy: simpler is better. The best battery isolator is simply a physical switch.

Advises leaving 3-stage charger on all the time connected to shorepower. Doesn't hurt and keeps batteries well-maintained.

Believes another alternator is unnecessary, especially since we have one of the best regulators on the market, and if the alternator ever fails, straightforward to order and replace either a new alternator or a new regulator (advises keeping a spare on board).

If an automotive alternator for starting battery, it would only suitable for charging starting battery, NOT deeply discharged house banks. Would only burn it up (heat build-up from trying to charge a lot more battery capacity than a 55 or 60A alternator was ever designed to handle.

High output alternator can charge both house banks and starting battery, as long as all are wet cells.

Could still use house batteries for starting engine if necessary, but normally, the starting battery would be used, NOT the house batteries.

Simplest and cheapest solution is to install a Dekka 4D starting battery, wire it to existing battery switch '1', combine two house banks into one and wire it to existing battery switch '2', and a new high current-handing (100A?) switch (On/Off) to kill all juice to the engine. This allows working on the engine, but still having power to the rest of the boat (code).

Also good in event of electrical fire in the engine room. Don't need another alternator (and another mount, and another tension arm, and a lot more wire). Just keep belt tight on current one. Existing battery switch would then always be left on "both", EXCEPT when at anchor. Then switch to '2' only to disconnect the starting battery from ship's load to save it for starting, and only use house bank for lights, frig, etc. When running the generator (and inverter/charger) or engine (alternator/regulator charger), again put on 'both' to ensure all batteries stay charged.

No problem having shorepower charger on when engine is started and automatically starts charging. Batteries will only take what they need no matter how many charging sources are connected, and nothing gets harmed.

Need a Zinc Saver (galvanic isolator), especially in a marina with a known hot shore power problem. We don't currently have one.

The generator sounds just fine. The clunk we hear on startup is just the generator bumping into the enclosure (as allowed by the rubber engine mounts). "Sounds perfect", BUT we should run it at least 30 minutes a month under load (couple thousand watts = 15-20 AC amps). Otherwise, these engines' rings tend to stick to the cylinders and lose compression. This is a great unit per Tommy.

The lights on the Heart Interface remote panel likely blink when flushing the toilet (electrically) because the negative (black) wire is connected to the battery side of the shunt, not the load side. Solution to try: move the black wire up one location to the load side of the shunt. In any event, Tommy thought this isn't hurting anything, just fluctuating the low-level current the remote panel is seeing, as provided by the shunt (milliamps).

Air conditioner sounds funny when run with generator. Tommy says if it works, don't worry, as long as the genset is putting out ~60Hz and ~120VAC. Probably slightly under powered for the bigger A/C. Just like on shorepower, run it til it fails (may never fail, so don't worry!)

Zincs connected to the bonding system protect metal on the entire boat. Zincs not connected to the bonding system (I.e., rudder zincs) still working, but providing protection only for the metal to which it is electrically bonded (e.g., just the rudder).