F32 Newsletter

The Journal of the Freedom 32 Sailing Yacht Vol. 4 No. 1 Jan-Feb.'90

Edited by John Lease, 197 New Road, Exeter RI 02822 (401) 295 7817

NEWS:

Item: Rendezvous-Good News Received from Freedom Yachts recently

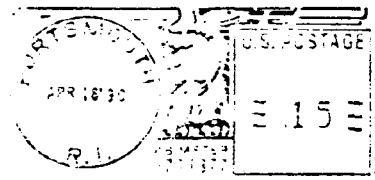
Save the date for

Freedom Rendezvous '90

Mystic Shipyard, Mystic, CT
July 20-21-22, 1990

R.S.V.P. by April 30th, 1990
For a registration application:

FREEDOM YACHTS
225 Alexander Road
Portsmouth, RI 02871
(401) 683-3500
Fax (401) 683-0539



FREEDOM YACHTS

225 ALEXANDER ROAD, PORTSMOUTH RI 02871

John Lease
BOX 334C
RI 02822

Item: Freedom Yachts

A recent visit with Paul Petronella, President, was encouraging and enlightening, to say the least. To say I was pleased with what I saw and heard would be a mild statement. During the hour we talked Paul pointed out that the niche in the market he and his partners were after will provide the buyer with a very high quality customized yacht that would be unique (individualized) and yet retain the Freedom sailing

(Cont'd next page)

characteristics we all enjoy. The owner can then be justly proud of his vessel and identify with it.

Paul is not aiming for high volume nor aiming to saturate the market with a lot of identical boats; volume will be moderate. Orders now on hand cover construction through the fall.

A tour of the plant emphatically backed up Paul's words; boats under construction showing a variety of interior arrangements with cherry, oak and curly maple panelling, for example, all fitted like fine furniture and very pleasing to the eye.

The line will also include yachts smaller and larger than the 45.

It sounds and looks good to me-ED.

Editorial Bildgewate

Your editor asks your forebearance for hi lateness in getting this issue out. There have been a number of extenuating circumstances the most critical being that of resolving the fuel tank problem prior to the beginning of this years sailing season.

I think we have dealt with this problem long enough without resolution, no more do I want to be surprised when entering a harbor or becalmed by suddenly being without power for no apparent reason.

As we have reported in the past, we(Don Peaslee and other owners, TPI and myself) have given this a lot of thought and test time. We have tested various potential solutions in boats and on test stands with partial success. My hope is that the following article will help us understand just what is going on so that we can prevent further surprises.

The Fuel Tank, Again

John Lease

For you that are unfamiliar with the problem, some of us have lost power when we have dropped sails on entering a harbor under power and have had to be towed, others have lost power while power sailing, both cases occuring at times when we had more than sufficient fuel on board.

In my cases(twice) the mechanic had to bleed the air from the fuel system to start the engine, but found no leaks in the piping. Only conclusion, the fuel pickup in the tank picked up air even though there was 1/2 a tank of fuel. But this was with half a tank of fuel.

Further study identified two common conditions extant in power failures while power sailing and powering alone; the fuel level is at 1/2 or less and there is a lot of wave activity. The wake created by passing boats at high speeds is enough at times to make my boat heel both ways 20 degrees, the resultant slosh of fuel allowing probably allowing air to enter the fuel pickup.

TPI found that placing a baffle in the existing tanks was not a practical solution.

Don found that shortening the pickup and moving it to the center of the tank helped when power sailing. This was tested in the Gulf Stream. Testing on the water is brave and not recommended without some assurance of success, especially near breakwaters or around other boats in a busy harbor. TPI agreed and built a test tank on a stand that allowed us to pull fuel at a relevant rate while sloshing the fuel from side to side at a rate approximating that experienced on the water.
(Cont'd next page)

(Fuel tank)
What we learned was this:

1. When the fuel is cyclically sloshed at a heeling angle of 20 degrees the original tank design and pickup did indeed allow air to enter the fuel pickup tube at a gauge reading of 1/2. (This is death to a diesel engine.)

2. Moving the pickup did not affect, one way or another, the incidence of air entering the fuel line.

3. Simulating the system used in chain saw tanks(a weighted ball on the end of a flexible tube so that the end of the tube follows the fuel puddle) made little difference. The difference is that gas engines are not killed by air in the fuel line. They might sputter or stop, but they can be easily restarted.

4. Everett Pearson designed a new system that consists of putting a baffle around the pickup, a tube within a tube, (tube on left in photos)installed in the same position as the present pickup. In the test tank this showed significant improvement, allowing the fuel to drop to below 3 gallons without air bubbles in the pickup, and allowing a starboard tack for several minutes.

The only problem we experienced was that the .093" dia. holes in the outer tube tended to become plugged by debris in the tank. This could possibly be a problem in the boat tank with sediment or growth. Enlarging the holes to .125(1/8)" helped but reduced the time we could hold the tank on a starboard tack at low fuel volume.

Now the fun started. My intent was to install the prototype tube in SANS SOUCI last summer in place of the existing tube. But 1. I had a full tank, 2. with a full tank there would be difficulty catching the chips from drilling 1 large hole and 8 small ones, and 3. the present position is too close to the tank side and back to allow it's installation. This meant plugging the old hole and repositioning the new one some distance away, requiring extended or replaced fuel lines.

This forced me, in my indolence(sic), to use up some fuel to reduce it to a manageable

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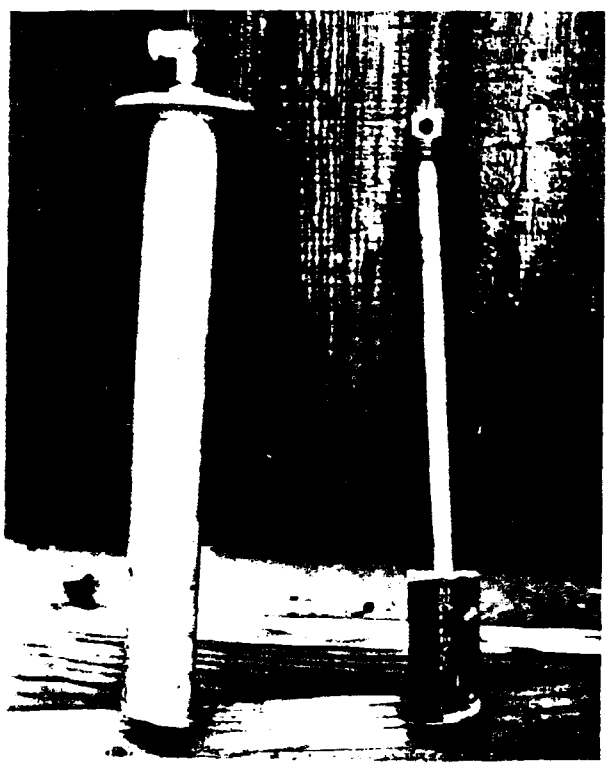

(fuel tank)
level and in the interim, to give the matter a little more thought. Several ideas came out of this difficult (for me) process.

The only portion of the double tube design that was functional was the bottom 4 or 5 inches, the part that screened the end of the pickup. If this worked installation would require only that the tube be raised enough for a cap to be slipped over the end. It would be retained by the bottom of the tank. Since this unit would be in contact with the tank bottom construction using materials that would wear through the tank bottom was important.

A prototype was built(on right in photos), and though not as elegant as the original, performed identically, preventing air from entering the pickup at very low volumes at alternating cyclical heeling angles of 20 degrees. Not only is this simpler to install but less expensive to make. A functional unit has been made and will be tested in SANS SOUCI this summer.

Meanwhile, back at the tank, we had noted in the past that to fill the tank from 1/2 to full per the gauge required 19-20 gallons. Strange for a 30 gallon tank. Something was whacko!

In using up fuel for insertion of the new tube we decided to run the level down to as close to 1/2 as we could read on the gauge and measure the depth. Calculating the volume from known tank dimensions and configuration(see sketch) indicated a retained volume of 9 gallons, not 15. Surprise! But it should not have been a surprise, the 14 degree slope of the bottom of the tank can do non-linear tricks on a linear fuel gauge.

(As Don Peaslee has so well shown in the past, the sloped bottom also plays games with the pickup on a starboard tack(see back issues) prompting him to place
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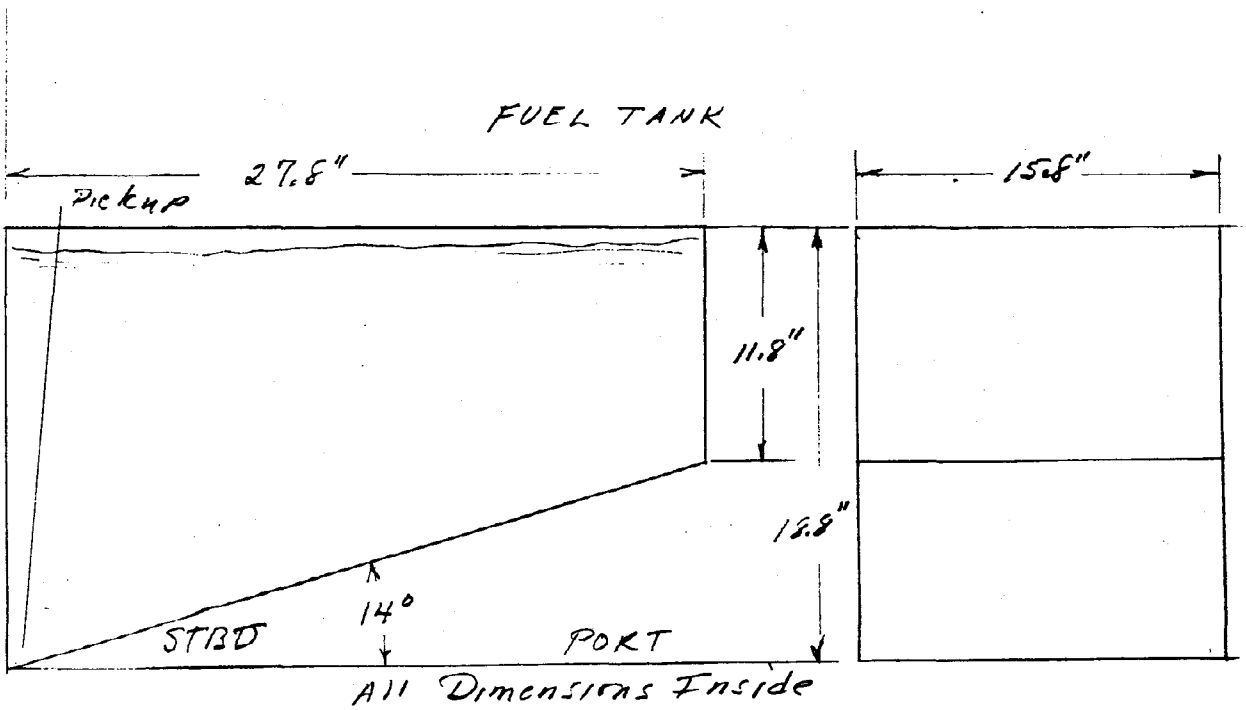


the pickup at the center of the tank or the center of the volume. The latter is somewhat difficult to determine since the volume shifts when the level reaches the sloped bottom.)

When I thought I had 1/2 tank I have actually had 1/3! This finding prompted further analysis and resulted in the data shown in the graph below.

At the indicator reading of 1/2 we have about 10 gallons on hand, at 1/4 gauge reading we have only 2 1/2 to 3 gallons on board!

Now, on reflection, it comes back; when we filled the test tank to 1/2 as measured on the high side of the tank we had poured into the empty tank just 10 gallons.

The conclusion one comes to is that the gauge and the tank constitute a mismatch, a linear guage in anything but a linear tank.

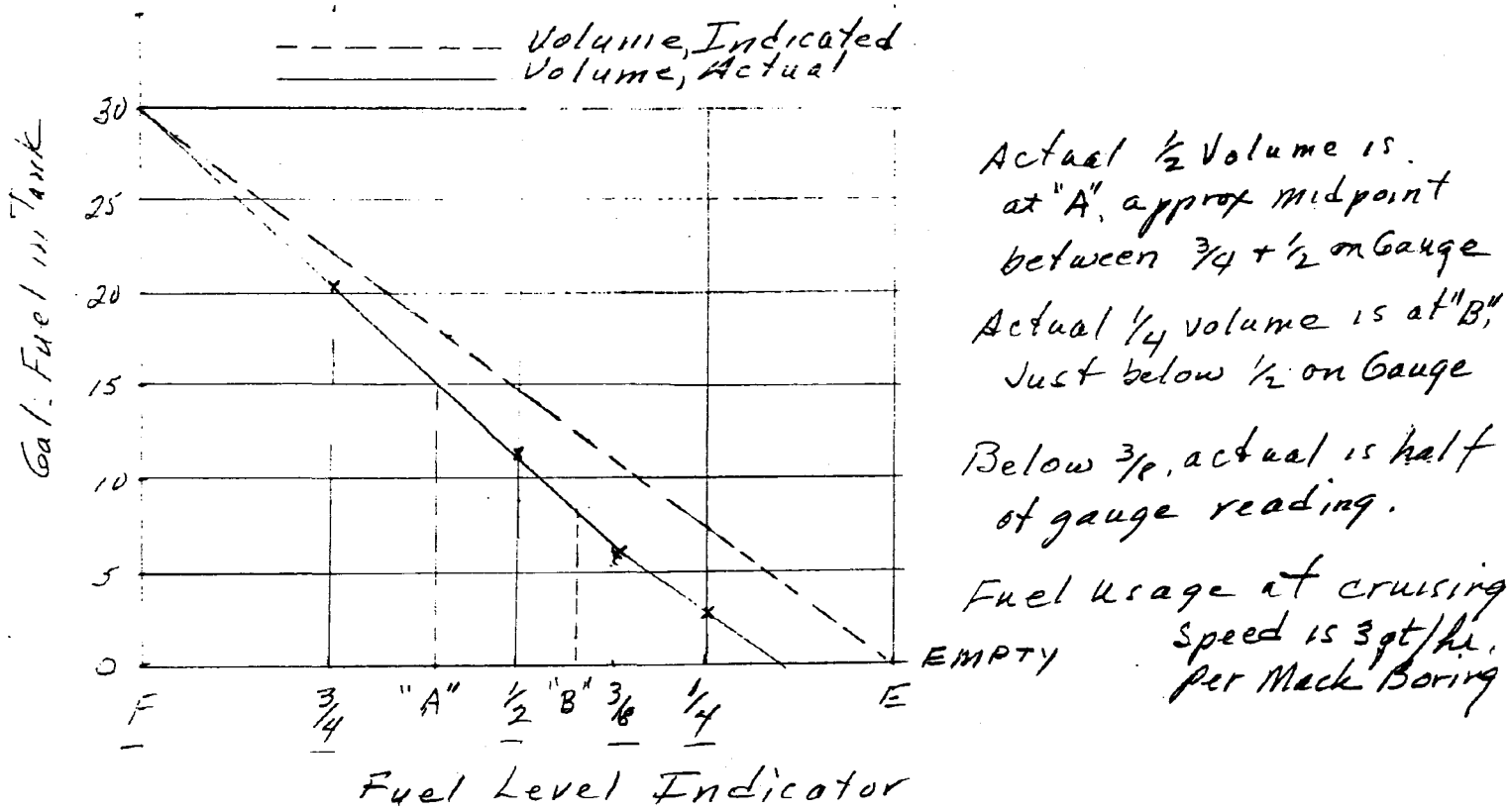
What's the fix? I am open to ideas and discussion.

What I will do is this:
1. Place the cap over the end of the pickup and test it this summer and perhaps be brave enough to run the fuel level down to 3 gallons.

2. Re-mark my fuel guage on the top of the tank according to the graph data.

3. Carry spare fuel on board.

4. Probably not run the engine when on a starboard tack of 14 degrees or over, or if I must, reduce the heeling angle through sail trim.



Actual 1/2 Volume is at "A", approx midpoint between 3/4 + 1/2 on Gauge

Actual 1/4 volume is at "B", just below 1/2 on Gauge

Below 3/8, actual is half of gauge reading.

Fuel usage at cruising speed is 3 gt/hr. per Mack Boring.

Mel & Jeanne Teare
21 Woodleigh Rd
Framingham MA 01701
January 22,1990

"AWOL" Hull # 45

Hi John:

I hope the New Year is treating you well and you have completed all those winter projects, remember you promised last summer.
I have finally got around to writing up the 12 volt system upgrade I installed last spring. I have been suitably impressed with the simplicity of this system, such that I wonder why seemingly reputable boat builders provide such poor standard systems and upgrade options.
I have taken the liberty to comment on both installation and use of the system. I hope you find them suitable for "F32", if not file them in the big circle.

All the best for the NEW YEAR

As ever

Mel & Jeanne

FREEDOM 32 - 12 VOLT SYSTEM UPGRADE

Problem Highlights:

Battery selection -- After considerable research and agonizing over the price ($654 BOAT/U.S.) I bought three Prevailer DF180 sealed Gel Cells, for the following reasons.
(1) Sealed batteries can be rapidly charged without the bother of a special regulator and/or hands on monitoring of the charging operation.
(2) Three DF180 batteries fit snugly in the F32 battery compartment, if you cut one end off the battery box. I could not get the box out of the compartment, I suggest you remove the mounting screws and use a small Jig Saw to remove front end of battery box.
(3) Gel Cells are maintenance free, operate in any position, there is no need to mount them high up in the boat. It is true that salt water is a conductor, but a poor conductor and no match for my bilge pump.

Alternator selection -- GO FOR THE MAX IT MEANS LESS ENGINE HOURS.
I chose Balmar 9115 ($435 BOAT/U.S.) for the following reasons.
(1) Small case size and universal mounting bracket available. The universal bracket did not include a new arm for belt tension adjustment, the company suggests I look through automobile junk yards for a suitable arm (#@%&*^%$#@). I designed a proper mounting bracket and used the standard tension adjustment arm, see figure #2 and save $31.95.
(2) 140 Amps @14 volts, 200 degrees. This is close to the upper limit in available current from small case alternators.
(3) Dual output allows charging of both battery banks simultaneously with proper control provided by monitoring only bank#2 as shown in figure#1. The battery with the lowest charge receives the most current.

Monitoring --WHAT? HOW? WHEN?-- Much has been written on the subject so I hesitate to offer yet another opinion.
(1) I highly recommend reading LIVING ON 12 VOLTS WITH AMPLE POWER by David Smead & Ruth Ishihara.
(2) The problem as I see it is proper methods for determining state of charge or remaining capacity are either to complicated or to bothersome for most boaters, hence we abuse our beloved batteries such that most of us get less than 50% of the promised useful life expectancy.

(3) Gel Cells are much more resilient to abuse than lead acid batteries but still require care. I believe simple monitoring and recharge routines can greatly improve expected life and reliability of our beloved 12 volt power source.

(4) VOLTAGE & CURRENT METERS are a must. I designed and built a 4-1/2 digit VOLT/AMP meter. It is convenient but probably unnecessary, hence I suggest you install an ampmeter and stay with your standard analog voltmeter. The most common way, add a shunt in series with battery bank #2 and couple it to an analog meter, can be done with off the shelf components. You may want to consider a digital panel meter as shown in figure #1, available from Digi-Key (1-800-344-4539) Part # DPM101 @ $43.70 and part #01B53 for 5000 ohm potentiometers @ $1.35. The meter requires a single 9 volt battery which should last a season of continuous duty. The cable from alternator output #2 to battery #2 acts as a meter shunt providing 2 to 3 millivolts per amp in my boat. You will need to calibrate using the 5000 ohm pot. There is a variation of about 0.4%/°C, but I don't consider it signifcant in this application.

(5) CHARGING If you are away from the dock with a small fridge running and the usual electronics, you will need to run your engine at 2000 RPM or greater for 30 to 60 minutes each day. I suggest two 15 to 30 minute runs daily, even gel cells don't like deep discharge cycles.

(6) STOP CHARGING WHEN? When your charging current drops by 50%. Remember the ability of our batteries to absorb charge decreases as they approach capacity. Don't waste engine hours and fuel charging batteries at low current. I believe my Gel Cells are at 90% of capacity long before charge current drops below 50 Amps, but I had limited opportunity to experiment last summer. The concept is to determine your charging capability with the batteries at about 50% of capacity, at your favorite RPM, and then note when it starts dropping off significantly. The batteries are approaching FULL, (you decide when to stop wasting fuel). Remember these comments apply to Gel Cells and standard voltage regulator.

(7) START CHARGING WHEN? Believe me, there are a lot of us still trying to figure that one out. Common sence has a lot to do with it, if you are away from the dock with autopilot, fridge, VCR, etc., charge twice a day and learn to detect almost FULL conditions to reduce fuel waste. NOTE! If you are like our Editor away with ice, oil lamps, and wind up ships clock, you can probably afford the luxury of shutting down one bank and waiting 48 hours to measure rested voltage as the text books describe.

I believe that a 0.3 Volt drop in normal operating voltage suggests its time to charge, a 0.5 Volt drop, DO IT NOW. The problem is in determining normal operating voltage. With high current chargers and high short term loads we often see battery voltage swings of 2 to 3 volts. Learn to interpret your voltmeter and compare you estimates of battery condition with how long it takes to recharge to about 90%.

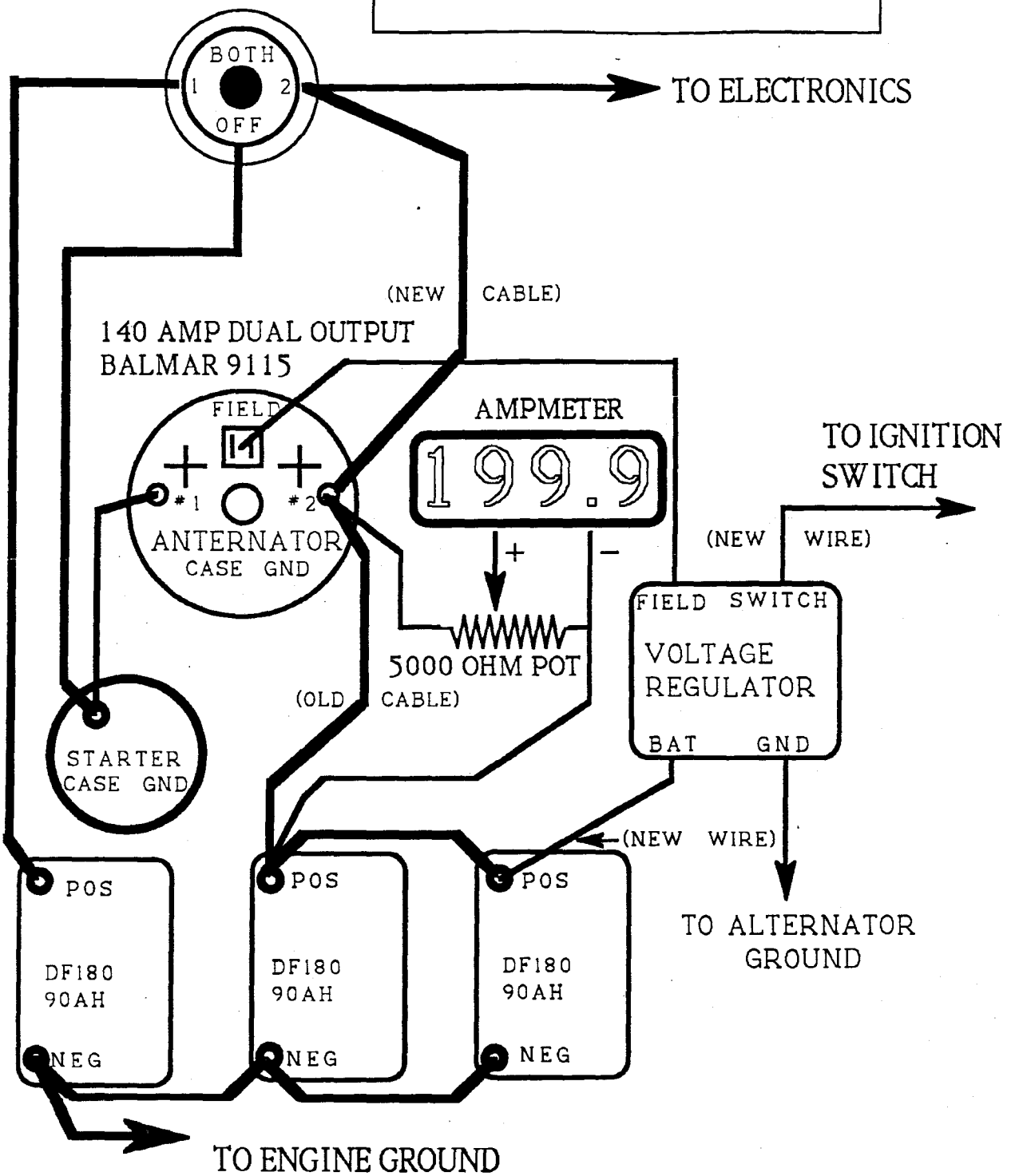
I hope all the High Tech Gurus forgive me for over simplification.

BRACKET FABRICATION -- I had mine made from 3/16" steel plate. It was over kill, but remember these small diesels vibrate, a sturdy bracket should reduce belt wear. The outside dimensions of the bracket are not critical, just the hole locations.
NEW BELT SIZE = 13 X 1060 mm.
ELECTRICAL HOOK UP -- New wiring requirements are minimal.
(1) Connect the cable from the starter (old alternator connection) to pin #1 of the new alternator.
(2) Pull the cable connecting battery #2 to the battery switch back into the engine compartment and connect it alternator pin #2.
(3) Install new cable from alternator pin #2 to battery switch pin #2.
(4) Connect alternator ground.
(5) Run new wire from voltage regulator to ignition switch.
(6) Run voltage regulator battery monitor direct to batteries as shown in figure #1.
(7) Add ampmeter as desired.

I connected my electronics directly to pin #2 of the battery switch so I could use battery #1 for engine starting only and still have the ability to use one or both batteries in an emergency. The use of a separate engine starting battery prevents Autopilot and Loran drop out during engine starts. For those people desiring a separate selector switch for the electronics there is an excellent location on the side of the engine compartment below the sinks for a starting battery selector switch. The present one could then be used for electronics.
For those of us requiring even more battery capacity, connect the three DF180 batteries in parallel for bank #2 and add a smaller DF150 mounted on its side above bank #2 (yes there is space) for engine starting use only.

One final comment batteries should not be left on continuous charge unless your battery charger has a proper float voltage, most don't.

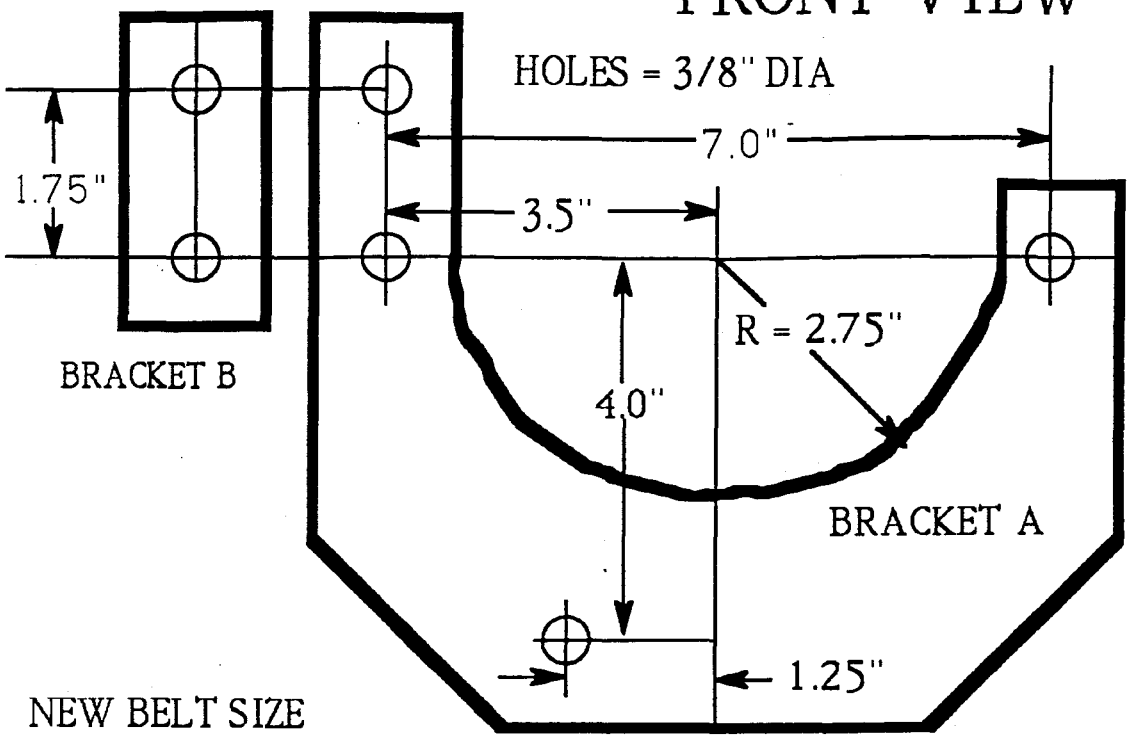
FIGURE #1
F32 12 VOLT SYSTEM UPGRADE



MEL TEARE
01/22/90

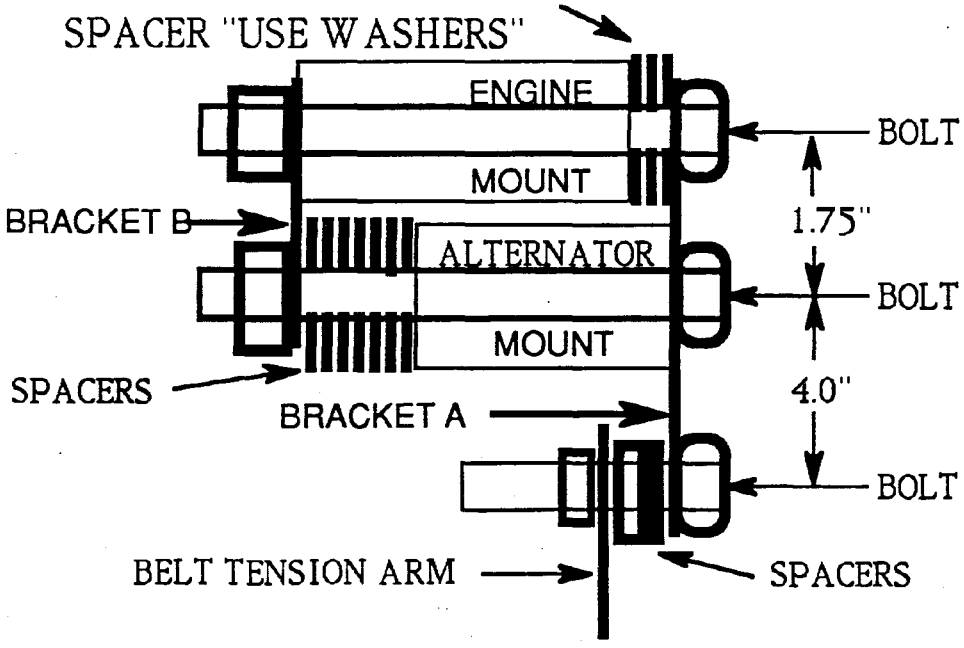
FIGURE #2

FRONT VIEW



NEW BELT SIZE
=13 X 1060 mm

SIDE VIEW



MEL TEARE
01/22/90

ALTERNATOR MOUNTING BRACKETS

Subscriptions

F32 is published every other month for a total of 6 issues/year. Subscription are $18/yr; additional subscriptions are available for crew paid at the rate of $15 by the owner. A subscription form is on the last page.

The publication of this newsletter was inspired by the interest demonstrated at the Freedom Rendezvous of 1986 and by the obvious benefits that would acrue by the exchange of information between owners concerning the maintenance, operation and customizing of the boats. F32s prime mission is to publish, in detail, information concerning the correction of problems and the implementation of improvements the the boats, F32s in particular, and relies primarily on reader/owner supplied articles. It will also carry articles of interest on cruising, racing, social events, interviews,etc.

All F32 author and editorial inputs are on a volunteer basis. Break even revenues come from about 70 subscriptions, so your support as a subscriber is needed and appreciated. Complimentary copies are sent to organizations felt worth lobbying.

Your editor will solicit the advice and assistance of Freedom Yachts as needed, maintaining a constructive and mutually advantageous relationship with the builder. However, F32 is an independent publication and expresses it's opinions free of influence of other organizations.

The editor and contributors are not liable for comments, suggestions and recommendations made in this publication.

Book Review:

E.Schoettle, in SAILING CRAFT.

" read what Gordon K. Seagrove has written about the matter under discussion:"

"If you need a diversion of another sort-something with a tingle, or peace when your soul cries out for peace-something that carries with it constant change and endless variety, what you want is sailing: what you ought to have is a sailboat. And now is the time to begin looking for one if you hope to be clear-headed and well-muscled next summer.

You will experience what no other sport with the possible exception of hunting, can produce-that feeling of complete and utter detachment from a drab and dusty world that comes when blue water is all about you. Again, you will find your spine a-tingle when you have beneath you a lean, lovely thing of wood and snowy canvas, racing along through cool water, the white foam crinkling and gurgling at the rail, going where you want her to go, leaping to your touch, and trusting to your skill as a fresh breeze whistles out of an indigo sky into the bellying sails. Back there, behind you are the office and sunbaked streets and the quivering heat; ahead only the cool and changing water and the distant shore-and the day to yourself.

there are the serene,sunny days when your craft slides lazily along the bluest of seas while you lie on your back counting the little scudding clouds and forgetting that your pipe is out. There are the moonlit nights, mystic and unreal, when your little vessel seems like an ethereal butterfly suspended between earth and sky. And there are still other nights when the clouds swing low and towering seas moan for miles behind you, and you wonder if so small a barque can make port where rest and friends and sweethearts are. Those are the days you taste content. Those are the nights you sample life!" 1947, out of print but in demand-Ed.

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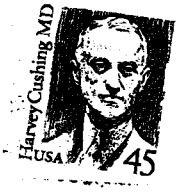

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