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model-boats.com/40884

Model Boats Website!

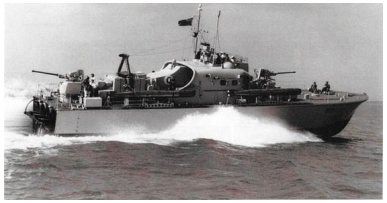
H.M.S BRAVE BORDERER

by Rowen

8th Apr 2018

H.M.S BRAVE BORDERER

Thinking of a future project and decided upon another launch type vessel. My earlier Daman 4207 project gave an interesting model with good performance. The Brave class of FPBs (Fast Patrol Boats) caught my attention. Can remember the incredible performance they offered when entering service. Only two of the class were used by the RN, although variants were used by other navies. Have decided to use proprietary Glass fibre hulls in future as they probably cost little more than building from scratch using wood and resin. They give a robust and watertight hull, but one which still requires thought to complete properly. There are several companies that offer a “Perkasa” hull, a Brave class derivative with an almost identical hull. From previous experience have decided to limit my models to 40” long, larger vessels become difficult to transport and handle. After much research considered the hull offered by MTB Hulls in Gibraltar met my requirements best. The inquiry to MTBHulls was well handled; the quotation acceptable, so placed an order. Was pleasantly surprised at the shipping costs. From the UK these often approach the cost of the hull, but from Gibraltar they are much more reasonable. Delivery only took 7 days.



Model Boats Website!

2nd Jan 2022

Brave Borderer

Have now had three years of good use out of this model and am well pleased with how she turned out. Although have never been entirely happy with the drive shaft noise, sounds rather like a high speed mangle! Have tried several approaches to reduce this. The attached photo shows three of them. The original installation used the steel joints shown at the top. These transmit the torque and rpm effectively. They are however, noisy. After a year or so, slide a tight fitting plastic sleeve over them. The second item, This restricts the backlash and reduces the noise. Have used the sleeve style coupling shown as the third item in several models, including my RAF RTTL. This is only twin screw, yet almost as fast as the Brave. It is also relatively quiet. Dismantled the Brave recently and found the coupling backlash had increased considerably. Also noticed the sleeve had become brittle, so no longer very effective. Have decided to upgrade to the sleeve style coupling and think others contemplating using the steel style might consider something similar. These different coupling are available from our friends in the Middle Kingdom. Still open to ideas though on other types as want to upgrade other, slower, installations in due course.

model-boats.com

15th Nov 2020

BLOG 29

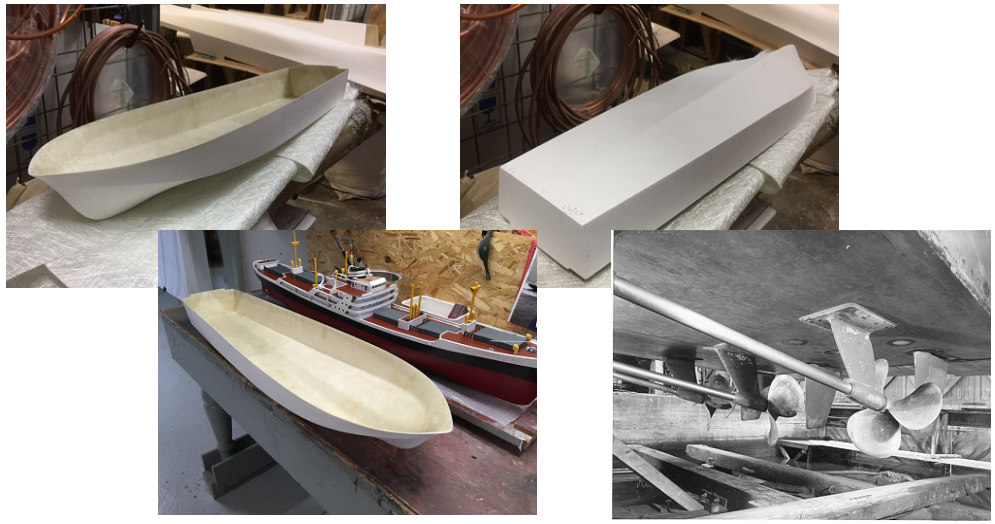
Spoke a little too soon! Had used 3 x 40A glass fuses in a ganged fuse holder to fuse each motor circuit and then use the extra fuse holder for the accessories. The centre motor has a consistently high fuse consumption so was concerned that if a fuse failed, the redundancy of the installation would be compromised. The outer motors did not fail fuses (different style of motors). A fellow modeler, who is an Electronics Engineer suggested using Automotive style blade fuses instead of the glass style. Blade fuses have a “slower-blow” failure characteristic. Suspected the fuse failures were being caused by high current peaks, not by a steady operating current. This modification could confirm that. Decided to purchase a 6 blade fuse holder from Banggood, but try a 30A blade fuse in each motor circuit. The three extra fused circuits would operate the cooling pump, ESC control and accessory circuits at much current lower levels. If necessary, blade fuses can also be obtained in up to 100A capacity. Whereas glass seem to have a maximum of 40A. On what is probably our last sailing day of the season decided to try this new layout. Over about 35 minutes of operation did not experience any fuse issues. She worked flawlessly. The boat will also plane comfortably on either the wing motors or the centre. Because of the small pond was not able to maintain top speed using all three motors for more that a few seconds, but am confident a scale 50knts is now obtainable. Task for the Spring. An added bonus, evident from the pictures, is this new arrangement allowed a simpler, cleaner wiring installation.

Model Boats Website!

13th Apr 2018

H.M.S. BRAVE BORDERER

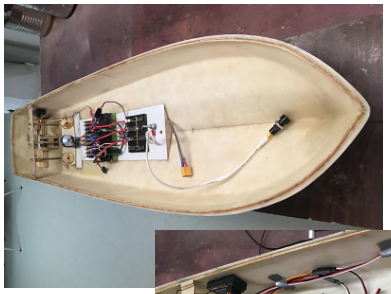
Just to clarify. Shipping was only 7 days to Canada, manufacture slightly longer. Examined the hull closely and was pleased. it is dimensionally accurate and robust, but light. it had also been reinforced in strategic areas and trimmed to the correct deck line. My many questions to Christian Sheppard – Capurro of MTBHulls were quickly and knowledgeably answered. A company I would recommend others. Reviewing the build blogs and U Tube videos of the both the Brave and Perkasa models, shows most use either single or twin screws. The original vessel had a triple screw contra - rotating layout. Experience from others suggests the third screw just adds weight and complexity, but little to the performance. Nevertheless, it was how the Braves were built, so that was how it would be. Christian gave several suggestions for other modelers who have built this vessel. Contacted them and was readily provided with information and advice. The finished weight of this model is important and a target of around 6 lbs recommended for a 1:32 scale version. This is to achieve the potential performance. Plans for drivetrain are 3 x 2835 4500kVa brushless motors, direct driving 3 x scale 3 blade 30mm screws. Decided use a single Li-Po battery for the best performance with minimum weight. It was suggested three batteries, each powering a single motor would be the best layout. After some research, concluded this would introduce a weight penalty and was discounted. There are various ideas for the best drivetrain. Unfortunately none for triple screws. Decided the best approach would be to fit the bare hull out as planned, then try it. Leaving all the finishing features for later. A contact in Australia had already done this using a single screw layout and kindly sent pictures of his hull layout and then under test. Very informative. The positions of the rudders, propellers and shafts are established by the scale dimensions and were permanently installed. Everything else was to be temporarily fitted, so it could be moved or replaced if necessary.

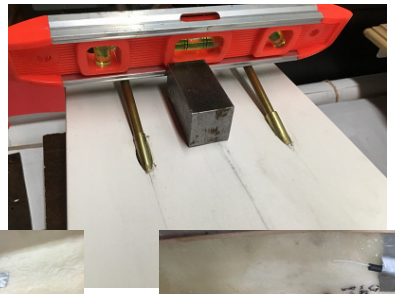


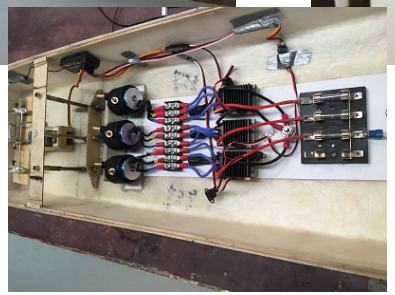
19th Apr 2018

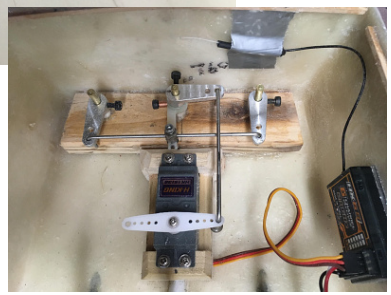
H.M.S. BRAVE BORDERER

Once the rudder, propeller and shafts were installed, the position of the motors could be established. A light aluminium bracket to hold all three was fabricated and bonded to the hull. Due to the high speed capability of the brushless motors, particular attention was paid to alignment. Also kept to the shortest prop. shafts that could be fitted to avoid whipping. Although the motor type might change, whatever is best will require a sound electrical installation as the current requirements for each brushless motor could reach 50 Amps. Wired each motor and ESC separately with its own dedicated fuse to give the maximum system protection. There is an extra fuse section allocated for auxiliary circuits, such as a cooling water pump and lights. Will try the original planned layout of 3 x 2835 motors with 30mm propellers and a 2S Li-Po battery first. Am hoping the reduced voltage will also make these motors more tractable. For the test program the three ESCs will be each controlled from an individual Rx channel. Once the final layout is determined, a more sophisticated and flexible control system can be installed. To minimize ballast, particularly around the stern, the battery will be housed as far into the bow as possible. After the test runs the final battery type, size and location can be established. To assess performance, hope to try both 2 and 3S Li-Po batteries. Planning to reduce heat build up by fitting cooling water jackets to the motors, these are easiest to instal at this stage so the wiring or mounts are not disturbed in the future. Have not decided the layout for the water circuit yet, but this easily can be added later. All that is needed now is the ice to melt off our local lakes so tests can commence.









Model Boats Website!

21st Sep 2020

Brave Borderer

Blog # 28 Used the Brave many times this summer and have made some significant upgrades. The original Turnigy (Hobbyking) ESCs both burned out - the smell still lingers beneath the deck! Both were rated at 30A and were protected by 30 A fuses, exceeding the measured maximum current draw. Have now had too many Turnigy ESC issues, so decided to replace the penultimate failure with an inexpensive Banggood water cooled ESC of the same rating. It had been previously purchased for another project. After several frustrating hours trying to program it through a series of beeps got it to work as desired. Was amazed at the difference! This ESC provides good low speed modulation and control throughout the motor speed range. The second Turnigy ESC then failed, so immediately replaced it with a similar Banggood one – this also works fine! Have used the model with these new ESCs for many hours and am pleased with their performance. One of my friends has a GPS speed tracker, so could measure how fast the model actually goes. The max scale speed only equates to 37 knots - well below the 50 + a Brave could achieve! Nevertheless it still planes easily and looks great. As the low speed control is so vastly improved, decided to replace the centre shaft brushed motor with an inrunner brushless purchased earlier. This should improve performance, perhaps even achieve the scale 50 knots! The drivetrain layout would also replicate the actual vessel, where the wing engines can be used for manoeuvring and the centre to supplement them in higher speed situations. Bought and fitted another Banggood ESC, to this same spec. However, this one came preprogrammed with usable default settings, no beeps to decipher! Works fine and the performance has increased markedly; will get around to measuring it one day, maybe in the Spring as the weather has turned noticeably colder.

24th Jun 2019

H.M.S BRAVE BORDERER

The weather has finally cooperated and have had one good outing at a local lake. The performance is consistent with the previous blog, however, observed over a much greater distance. At full speed on all motors the plane exposes more keel than pictures of the real vessel; but the throttle can be reduced to slow the model and lower the bow. The centre shaft performance is adequate, which helps maneuvering and also serves as a “get home” back-up. The pictures show the model at full speed with all shafts turning and at full centre shaft speed only. The brief video shows the model at full speed and then slowing as the outer shafts are stopped. On 1 x 4500mAh 3S battery, life is around one hour at a mixture of speeds; with both single and three shafts operating. In summary a great project, one that has proved both challenging and satisfying.

Model Boats Website!

24th Apr 2018

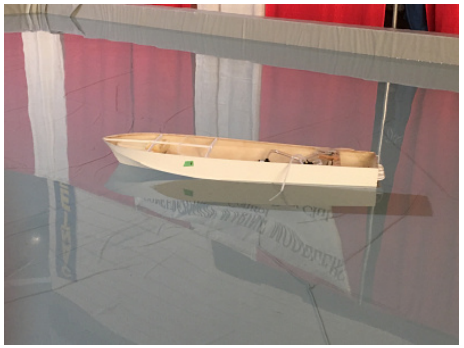
H.M.S BRAVE BORDERER

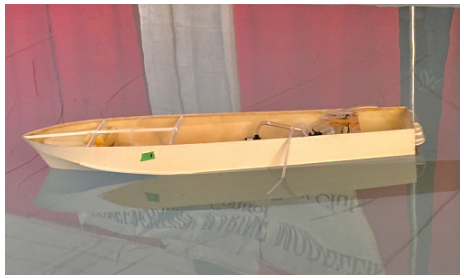
Whilst waiting for the ice to melt, decided to make up the deck and transom flaps. The deck was made from styrene sheet, again for lightness. Made the deck beams out of square styrene sections to avoid traditional, heavy, full width bulkheads. Hoped the stiff MTBH hull would resist twisting without bulkheads. First impressions are that this is the case and when the deck is finally bonded to the hull, should be even better.. The transom flap was made from thin aluminium plate and added simulated stiffener ribs in styrene. Understand that about a 2 degree flap down inclination works best on this model. My original plan was to operate the flap using a servo with another radio channel, however once the best plane is achieved it is unlikely the flaps will need further adjustment. Unlike the real vessel, the operating weight will remain fairly constant. So, abandoned the servo idea to use adjustable bottle-screws instead. The flap angle can still be adjusted, but not in motion. These screws are much simpler, lighter and cheaper than a servo. One challenge was to make the very small hinges required for an adjustable flap. After much thinking and investigation, decided the simplest and neatest way would be to use thin, self adhesive aluminium tape, as used on forced air heating ducts. Would stick the self adhesive surface to the underside of the flap and then onto the inside face of another thin aluminium sheet, which could then be fitted to the transom using double sided tape and small screws. This seems to work so far, it also avoids drilling through holes into the transom .

30th Apr 2018

H.M.S. BRAVE BORDERER

An unexpected opportunity arose to try the unfinished hull in a small pool. Whilst the performance envelope could not be explored, was able to try and measure operating parameters and get a “feel” for the model. Used an electronic scale and a combination voltmeter/ammeter/wattmeter to measure propeller thrust /bollard pull and motor power requirements. if it is necessary to fit different drivetrain components, or a 3S cell this will serve as the baseline. The model floated levelly and well above the waterline. At about 8 volts the motors drew around 20 amps each at full speed; so only about 35% of the potential output capacity was being used. Tested each motor individually and measured the bollard pull at just over 2 lbs. A considerable amount of spray and wash was created making stable readings difficult. For further testing, will add ballast at the stern to hold the propellers further underwater. Should help reading stability. Currently using 20 A fuses; which as one failed seem marginal. For sustained use think 25 or 30 Amp better. With these high-speed, low torque motors establishing the “dry” propeller rotation is deceptive. Found one motor to be reversed! Nevertheless, the model accelerates quickly and is sensitive to engine speed movements. Left the pool with a list of modifications to make before assessing the installation properly on an adequate body of water. Some conclusions can be made though. if it is necessary to add a second cell this needs to be located around midships, not in the bow or stern. Still hoping a 3S cell will not be necessary and that 2S may be adequate. The suggestion to do testing using the bare hull with a minimum of detail was a good one. For a models with a sophisticated power train think this is a good approach. Nothing worse that finishing a boat just to find the performance disappointing, then have to to rip it apart to make major modifications or adjustments!





Model Boats Website!

26th May 2019

H.M.S. BRAVE BORDERER

Did more testing and then reprogrammed the ESCs and Rx. These changes allowed the removal of the brushless motor selection circuitry and improved the tractability of the system. As the videos show, a plane can be achieved with both 2S and 3S batteries. With the 3S the plane is flatter and faster. Suspect this is due to the increased vertical component of the propeller thrust forcing the rear of the vessel upwards, lifting it and lowering the bow. Of the two, the 3S resembles the original vessel pictures more closely, the bow lifts too far high with the 2S. The videos show the vessel in motion. The first shows a run with 2S batteries, the next two show similar runs with 3S. Just found cannot upload three videos on one blog. Anyway, they can all be seen on UTube under 'Brave Borderer blog'. Anticipate further refining of the powertrain with a future running, but doubt any significant improvements will be achieved. Performance is great anyway and am very happy with it. This will be the concluding post for this model.

model-boats.com

26th Apr 2019

H.M.S BRAVE BORDERER

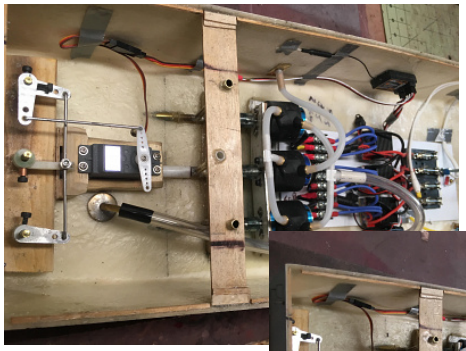
After the trials, tribulations, experiments and frustration, can finally announce this model is sailing well. It has excellent performance and looks, both on and off the water. A build really for the more experienced modeller though. If the performance envelope is to be explored it should be done on a suitably large area of water with few other vessels around. However, enjoyed building a model of an unusual class of vessels. It expanded my knowledge and skills, then kept me occupied throughout a Canadian winter! Have also been lucky to have received considerable useful advice from other modellers, which was much appreciated. Building from scratch off a proprietary glass fibre hull gives a robust model with plenty of opportunity for individual input. Intend to use this approach again. Whilst am rather blinkered about building scale models to scale; considerable frustration, time and money could have been saved by using a single or even a twin screw layout, rather than the triple. Performance might also have been further improved and weight saved. Several of the U Tube videos of the similar Perkasa models show how well these layouts work. There are several photos attached; 1) Stationary. 2) Max. speed using the centre screw brushed motor and then the outer brushless screws on the 2S battery 3) Max. speed using the centre screw brushed motor and then the outer brushless screws on the 3S battery. Because the pond is small, was unable to capture the marked differences in performance between the 2 and 3 S batteries. It will plane easily on either, just rather more frenetically on the 3!. Suspect this was because of the difficulty in coordinating acceleration, photographer and deceleration. Will endeavour to get pictures and a video that make this more obvious and post when available.

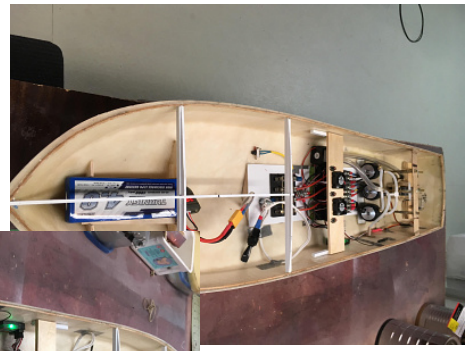
Model Boats Website!

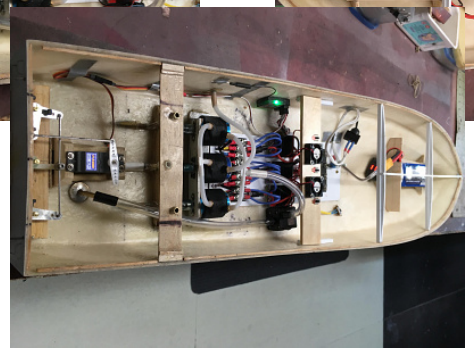
2nd May 2018

H.M.S. BRAVE BORDERER

From the brief pool test, had decided that the motors could be susceptible to overheating, so connected up the water jacket cooling system and powered it with a small pump. Did not leave enough space to fit a scoop behind a propeller anyway, but prefer the positive action of a pump though. From feeling the ESCs, was also concerned they could overheat within a confined space such as the hull. Mounted a couple of small fans in a bridge structure above the ESCs, along with the ESC switches. Not sure either of these cooling modifications are really required, but erred on the side of caution. Final weight of the hull, with all electrics (apart from battery) comes to 5.05 lbs. Looks like will not achieve the target weight of 6 lbs, but am hopeful will be able to get close to it.. Built the deck up with gun mount bases and a removable decking over the engine area. This limits access to the internals; so will not fit it permanently until the test program is complete and all modifications incorporated. Have now reached a point where any further work will be to start finishing the model, unless drivetrain modifications are required. Have thus decided to leave it until after the first open water test date. This will be in late May as am away until then.







model-boats.com

24th May 2018

H.M.S BRAVE BORDERER

Looks like everything is set for the first open water test. Sun is shining, ice has gone and water smooth. Intention is to start the open water test program with a repeat of the pool test, except this time with everything wired correctly; the load cell positioned so the “pull” is more horizontal and ballast available to hold the propellers underwater if necessary. Hope these improvements help reading stability. To modify the “pull” arrangements, wrapped a light cord around the propeller shaft struts and fed the loose end above the transom shelf and out over the stern. The load cell was hooked into this and then tied to a fixed grating on the pond side. Started by measuring the electrical requirements for each of the three motors and the propeller bollard pull, using the 2 S battery. Found the bollard pull was up slightly at almost 3 lbs per propeller. Probably because they were now held at a greater depth in the water. Also blew several 20A fuses, so fitted 30, which seem to work. A series of runs showed adequate performance with plenty of spray, although the bow did not lift much onto the plane. The forefoot did raise almost above the water surface. Then tried a 3S battery. Although this was much heavier, the performance improved dramatically. The bollard pull was up to almost 18 lbs per shaft. The bow still did not lift much to a plane, although the forefoot was almost clear of the water at full speed. The battery was located just back from the bow, so it is suspected that it held the bow down. The impact of the transom flap down angle could also hold the bow down, but have decided to leave as is for the time being and avoid the temptation of making too many adjustment at once. Whilst it is still too early to draw definite conclusions, it seems as if a 3S battery will be required. The model sustained some slight damage due to the test arrangements, so will repair that and also fit the 2 bladed Hi Speed propellers. Will then repeat the program and report. Should be able to draw some definite conclusions then on the best power train. Neither of the batteries used, neither the 2 S nor the 3S are ones I would choose for this model. As a result the capacities and weights are not ideal. That must also be remembered in future deliberations.

Model Boats Website!

23rd Apr 2019

HMS BRAVE BORDERER

Getting ready for the maiden voyage after the extensive winter upgrade and stumbled across an article on programming Hobbyking ESCs. Have always been concerned about the “stuttering” of the brushless motors. This is more correctly identified as “cogging”, often caused by incorrect motor timing. Changed the timing to “Automatic” from the incorrect previous setting, which was for inrunner motors not outrunners. Now much smoother acceleration from neutral to full speed. On the water, first, the brushed motor centre screw concept works well. It allows controllable maneuvering and powers the model nicely in a displacement mode. No planning, but with a reasonable bow wave. The model weight is a little high, as she rides towards the top of the boot topping. Tried the brushless outer screws and realized my efforts to “detune” the motors were overdone. The model performance was adequate, but still had difficulty in getting both motors to run consistently and smoothly. Think the water drag was slowing the motors more that expected as they had worked satisfactory on the bench. Adjusted the ESC output back to 100% - much better. After 45 minutes of running the battery alarm came on, curtailing trials. She planes very much as the real vessel did, lifting the forefoot clearly out of the water. Had a spare battery, but 3S not 2. Was apprehensive about the increased power this would bring, but as the model was operating satisfactorily decided to try it. Better still! Motors now work consistently smoothly and in concert throughout the throttle range. The top speed exceeds any picture I have seen of the Brave class though. Can readily get a third of the hull out of the water. Will conduct more trails, but need a larger pond to give time to experiment with the various control settings. Hope to post a concluding blog with pictures shortly.

model-boats.com

7th Mar 2019

Brave Borderer

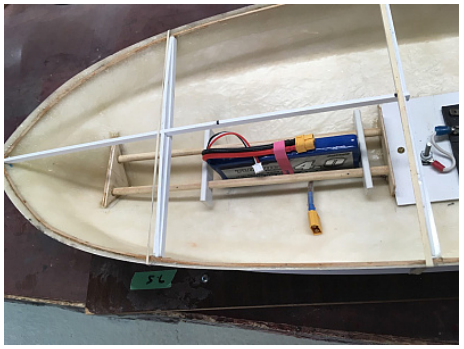
During our protracted wait for Spring, have had chance to reflect on the earlier tribulations with the brushless motor installation. My enthusiasm was sparked by an article on getting the best from your Tx in a magazine and the advantages of using the Elevon or V Tail facilities if available. My Flysky Rx/Tx has this facility, so after some experiments, set the boat up to use the Elevon function. This puts both motor ESCs on the same control lever, so advancing the control accelerates both screws equally and moving to either side accelerates, or slows the appropriate motor. Think this will reduce the coordination previously required to sail in a straight line. Fresh from that success decided to experiment further. The Tx allows reducing Servo throw, so tried that too so could reduce the max. ESC output, it also seems to work. One problem with the original layout was that if the forward speed was reduced quickly it was very easy to move the lever through the neutral point, overshooting into reverse. This immediately reversed that motor causing erratic operation. The Tx also has a “Dual Rate” facility to adjust the lever response from linear to various alternate rates. This allows the neutral point zone to be increased, so the tendency to overshoot into reverse is reduced. Bench tests of these adjustments suggest the model will be easier to operate. Hope they will make controlling the models performance better in our closest pool, which is quite small. A further precaution to prevent inadvertent operation of the brushless motors when using the centre, brushed one, was to add two small relays; one into each of the white ESC signal wires. This allows a another channel on the Tx to be used to select, or deselect the brushless motors. Anticipate that by turning this channel and thus the brushless ESCs off, manoeuvring can be accomplished without the operation being overwhelmed by a brushed motor inadvertently being operated. My patience for Spring is getting thinner!

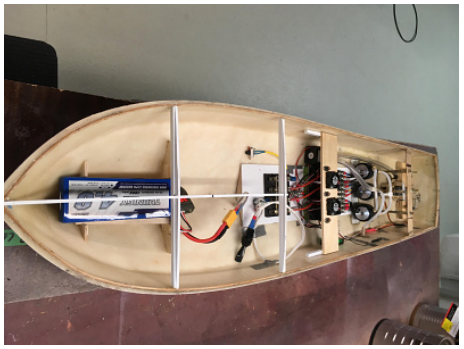
Model Boats Website!

30th May 2018

H.M.S BRAVE BORDERER

itted 2 x two bladed 35 mm “hi-speed” propellers to the outer shafts only as these are the easiest to change. Can also use the centre shaft measurements as a check of the previous figures as it is unchanged. With these propellers the current draw and bollard pull both increased. Subjectively, think she was also slightly faster, but the speed exceeds scale speed anyway. The increased load on one of the 2 bladed props wiped the blades off and several 30 A fuses on various motor circuits blew. Originally, the battery was fitted as far forward as possible to hold the bow down – some thing it seems to have achieved! Decided to remove the forward battery location frame and replace it with one which will allow the battery to be positioned anywhere between the bow and the centre of the model. The battery can now be located where the best plane is achieved. Once the correct battery is fitted the final location will be determined. This frame movement will also allow adjustments for any weight gained during final finishing. Whilst the idea of using a load cell and ammeter/wattmeter to measure bollard pull and motors loads sounds logical, it is fraught with challenges. The vessel both bucks and the readings fluctuate wildly under load making getting steady, consistent results difficult. Off now to cogitate over the results and decide a path forward.





model-boats.com

1st Jun 2018

H.M.S BRAVE BORDERER

Now the spray has settled have assessed these first tests; have also reviewed various pictures and U Tube videos of the Brave and Pekasas in operation. The actual vessels look to plane rather like mine, whilst some model bows lift up until a significant length of keel is exposed. Anyway, have been able to draw some conclusions: 1) Moved the battery towards the stern and, at speed, the forefoot lifts slightly clear of the water. The plane is now almost flat. The battery is not well positioned when near the bow. 2) The 2S battery used was a 4000mAh 30C; suspect this battery does not have the capacity to operate the model. Every motor will run up smoothly until a second one is operated. The first motor then “stutters” and a fuse might blow, this could be indicative of a power surge. Any comments from the electronic experts among the group would be appreciated. 3) The 3S battery was 10,500mAh and 40C; with this battery all three motors can be run at full speed together and fuses do not blow. it was also very heavy at 1700g, holding the model down. 4) The motors are 4500 kV. On refection, think a slower motor around, perhaps 2000 kV would have been a better choice. 5) Would concur with comments by others that a simple single or two bladed propeller layout for this model is probably best - that is unless you want to capture the true scale layout. The centre propeller seems to have little effect on overall performance, although it will power the model quite nicely when operating by itself. Have had several suggestions about how best to use the centre propeller. Will think about them and decide later how to do this when I start to finish the model. 6) The 2 blade Hi – speed propellers both increased performance and current draw. The model is more than fast enough with the original scale layout. 7) Will purchase a lighter, 3 S battery as that seems the best choice for performance and weight. 8) Testing using the bare hull with a minimum of detail worked well. For a models with a complex power train, this is a good approach as access to the internals can be gained easily. Nothing worse that finishing a boat carefully just to find the performance disappointing. Then having to to rip it apart to make major modifications or adjustments!

Model Boats Website!

27th Jan 2019

HMS BRAVE BORDERER

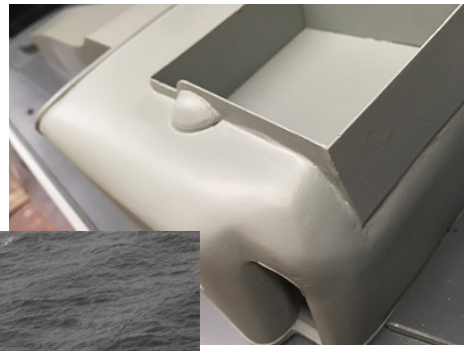
Winter seems to encourage modeling, have spent many hours in hibernation working on the deck and superstructure details. A supplier offers a full set of Perkasa fittings, most of which would work on the Brave B. At one point considered buying a set. They are made in both resin and cast metal. Eventually parsimony prevailed, so only purchased a small number of hatch covers and other intricate shapes that would be difficult to make well. The items duly arrived and the quality is good. Was surprised by the weight though, so am pleased had embarked on making the other items from the usual materials. There should be an overall weight saving, along with a reduction in my surplus styrene and wood stock. One of the design tenants of the Brave class was flexibility. The vessel could operate as a MTB, MGB or Raider, or with a mixture of these capabilities. The weapon mountings were designed to allow armaments to be installed and moved around to suite the requirements of the role. Have reviewed many Brave class photographs trying to establish a “standard” armament configuration, to reproduce. Not only does the configuration define the weapons installed, it also establishes the ammunition and flare storage cabinet arrangements. Eventually decided upon the 2 x 40mm Bofors gun arrangement with 2 x 21” torpedoes and 4 x extended range fuel tanks. The model is now essentially complete. No doubt as I keep examining it will add further small details and refinements. Only disappointment so far is that it does not achieve the original weight target of 6 lbs, it is 9.5 lbs. The 6 lbs may possibly have achievable using one screw and motor etc., but once three are installed, not likely. The real test is when finally back on the water. Will close this blog then with a concluding report.

model-boats.com

23rd Dec 2018

HMS BRAVE BORDERER

After completing the cowl, turned to the rear structure covering the gas turbine and other engine spaces. This can readily be made from styrene sheet. The sides and top were cut out, reinforced with “L” shaped angle and fitted together with CA glue. No particular challenges, other than determining where the various section transitions occur. Luckily had two different sets of plans to compare, so the nuances could be established. It was not until the rear structure was fitted into the cowl, the assembly fitted to the removable deck and placed on the hull, realized just how important this milestone was. Once everything is firmly located the accuracy of build becomes readily apparent. Any inaccuracies show up as an obvious misalignment. Was able to check the alignments and squareness using eye, rules, squares and a spirit level and was pleased with the outcome. A subtle sanding of about .020” off the base of one side of the superstructure and everything became square, parallel and correctly aligned. Quite a relief! Have always stressed the importance of accuracy throughout a build. This supported that recommendation. Once the superstructure was completed realized my plan to lift the deck off to gain access to the electrical control switches was impractical. Have thus cut a small access hole in the rear deck to facilitate access. Still undecided how to best disguise the hole, but at least access is now relatively easy. From now on, until the test program can be continued on the water, will add detail to the model. Doubt there will be much to describe is that of interest, or that has not been covered by others. Will continue this blog once there is anything significant to report. In the meantime, best wishes for Christmas and 2019,



Model Boats Website!

18th Jun 2018

H.M.S. BRAVE BORDERER

Decided to retry with the 2S battery and the original scale style propellers. Concluded that the speed is fine, especially in the windy conditions encountered and in a small pool that limited acceleration. The model had a very flat plane, must adjust the transom flap angle to see what effect that has. The forefoot did not rise much from the water surface. Was frustrated by the “stutter” referred to in the last blog, noticed this occurred on the two out shafts only and when the starboard was operated after the port was running. Swopped the starboard motor over with the centre one to see what effect it would have. As started to remove the motor noted that a connector was not tight and that the screw had corroded. Exchanged motors, removed all connectors then cleaned and refitted using a water resistant lubricant. The stutter seemed cured. Another lesson learnt, when dealing with these high currents every connection is tested and all defects exposed. The opportunity to retest using a 3S battery arose so installed it, all worked fine on the bank. Put the model in the water and a major short occurred. 2 fuses blew and about 6” of wiring melted and burnt through the insulation. At least there was no hull damage! Did an inquest and, apart from the damage described, also found the starboard ESC and motor had failed. These were the ones where the “stutter” originated, but cannot see any correlation between the two problems. Discussed the model with some of fellow scale modelers and concluded that the 4500kV motors are unsuitable for the scale propellers used. Every suggestion points toward motors in the 1 – 2000kV range. As now needed to obtain a new motor and ESC, decided to reequip both outer shafts with 2000kv motors and water cooled ESCs. Felt modifying these outer shafts would allow assessment of this new drivetrain combination, could then decide what approach to take with the centre shaft. Due to the mounting and driveshaft arrangement, the choice of motors was restricted to 28mm O/D with a 1/8” shaft size. Unfortunately, suitable items are on back-order from Hong Kong, so there will be no further updates for a while.

model-boats.com

8th Jul 2018

BRAVE BORDERER

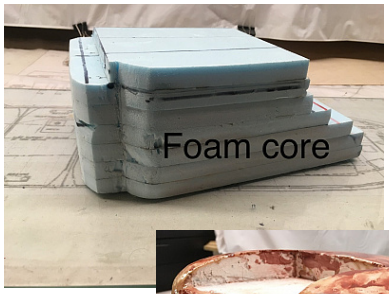
Whilst waiting for the new motors and ESCs, reviewed videos of the vessel under power and noted that as the speed increases, the bow lifts towards a plane. However, as she gathers speed the transom flaps become effective, forcing the bow down in a cloud of spray. At this point the plane has been lost and the model becomes almost uncontrollable. Decided to temporarily ballast the hull to simulate the new motors and ESCs, then try to establish the optimum flap angle using just the centre propeller and shaft. This is the original 2838 brushless motor installation with a 30 mm propeller. With this simulated drivetrain it would also be an opportunity to determine the best battery locations for both 2 and 3S Li-Po batteries. Made up an angle template with a spirit level to get the correct deck inclination with the vessel floating at rest. From this located each type of battery statically - somewhere close to the mid-point of the hull. Which also seemed as good a place to start as any! Somewhere in the research for this model found a reference to the transom flap angle. This was at a 2 degree -ve (pointing downwards) angle. installed the 2S battery and tried the model. The bow dug in at speed. Adjusted the flap to a straight and level position and tried again. The bow still wanted to dig in, but to a reduced extent. Readjusted the angle to 2 + ve and repeated. The bow now lifted so the forefoot just cleared the water and then remained in that position. Replaced the 2S battery with the 3S. The extra power obviously increased speed and the bow lifted slightly further. The spray was deflected by the chine rails and a level plane established. The conclusion is that the transom flap angle is critical to the correct planing of this model and that it should not be negative. Until the new motors and ESCs are fitted will leave the transom flap and battery locations as is. Once these components are installed, intend to repeat the test. Am confident that with some fine tuning the model can be now made to plane properly at a scale speed. Interesting to note that the model will just about plane with only one propeller operating – wonder what it will be like with all three?

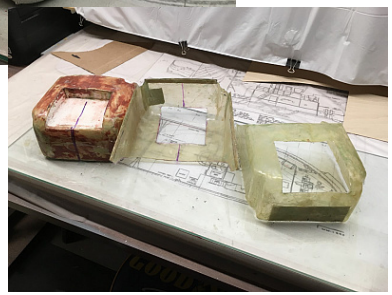
Model Boats Website!

3rd Dec 2018

HMS BRAVE BORDERER

Back to the build. Next milestone, to complete the superstructure and engine covers. The superstructure is essentially a cowl that supports the open bridge and serves as the air intake for the gas turbines. The engine covers fit into the rear of it. The superstructure is full of curves and will be interesting to make. Still trying to save weight, decided to make it out of glassfibre. Rather than first make a plug then a female mould and finally the cowl, wanted to try the technique of making a plug out of styrene foam sheet, then covering it in a glass fibre matt. Once the glass fibre is set, the foam is dissolved out using a solvent and the cowl remains – inshallah! To ensure the foam did not react to the glass fibre resin, painted the finished cowl with enamel paint before sticking the matt down. See pictures. What a mess! The resin had crept under the paint and into the foam dissolving it. When the resin dried the plug had shrunk slightly and had the surface finish of a quarry. First thought was to hurl it and start again, this time in wood. On second thoughts, wondered if the plug could still be used. Decided to build it up with wood filler and from it make a female mould, as originally intended. The cowl would then be made from the mould. Built the damaged plug up and sanded it smooth. As the plug would be covered in fibreglass, the surface finish was not critical. Brushed a coat of fibreglass on the plug and, after drying filled any defects with glaze putty and sanded smooth. Once the finish and dimensions were satisfactory, applied a thicker coat of glass fibre to the plug. This was again smoothed down, waxed with carnauba polish and then covered in mould release. From it the cowl was made. Picture shows plug, mould and cowl placed side by each. The cowl requires reinforcement; the fittings and various mountings then adding before installing. A trial installation showed that it fitted properly the deck and was accurate. A lesson for the next time is to make the plug and mould much deeper than the finished item. That will allow any rough edges, on either the mould or the component, to be trimmed off leaving a smooth fibreglass edge.





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20th Nov 2018

HMS BRAVE BORDERER

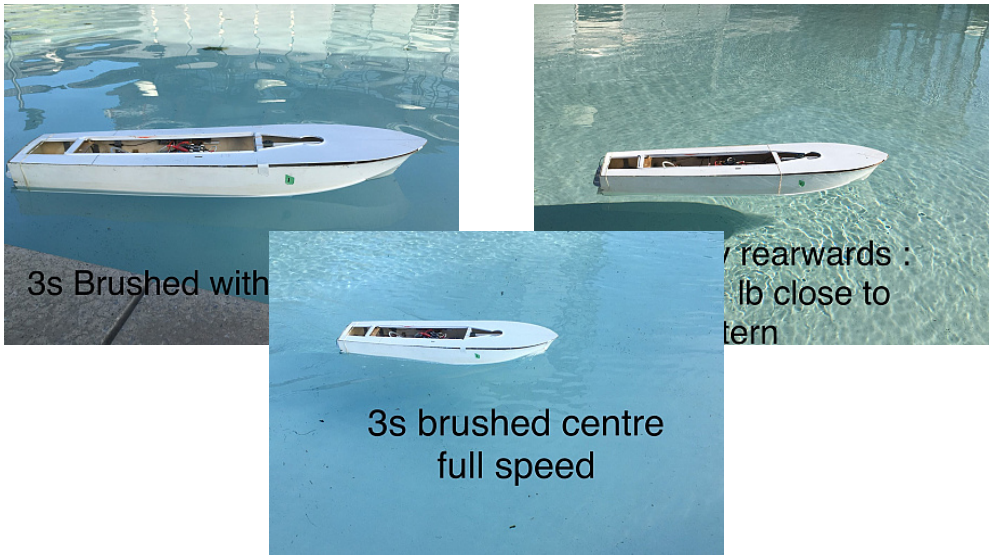
Finally the new brass propellers arrived, delayed about a month in one of Canada's regular postal disruptions. After minor modifications to the boss profile (the brass are more streamlined and thus longer than nylon) to give clearance with the rudder leading edges, they were easily installed. Could now refit the electrical equipment previously removed to get access to the shaft couplings. Inevitably took the opportunity to make “improvements”, so then could not get anything to work! After much frustration determined the problem was not from my improvements, but from the cheap and nasty slide switches provided with ESCs. These must have got damp during the test runs and corroded internally. Suggest when using these switches they be consigned to the garbage and replaced with proper toggle ones. Had decided to use the centre brushed motor/propeller for manoeuvring and low speed operation and then the outer brushless for high speed. Brushless ESCs do not modulate smoothly and motor operation is erratic. This was particularly evident when going from forward to reverse and vice versa. Using a lever control Tx, it was also easy to inadvertently operate the brushless control along with the brushed making the model response unpredictable. After some thinking, decided to insert a small relay into each of the white signal wires for the brushless motor ESCs. These relays would be controlled by a RC switch operated by another channel on the Rx. Hoping this way the brushless motors could be switched on and off whenever desired. The two relays would retain the ESCs as separate circuits and avoid any interference between them. The idea worked, can now operate the brushed motor confidently knowing the brushless will not be inadvertently triggered. This means low speed manoeuvers can be gently undertaken using the modulation and control ability of the brushless motors and, by selecting the auxiliary control, can add the high speed capability of the brushless. Am also hoping that when the Li-Pos trigger the low voltage cut-outs in the ESCs, this will retain a “get-home” facility on the brushed motor as that ESC operates independently. Much to look forward to when next on the water.

Model Boats Website!

23rd Jul 2018

BRAVE BORDERER

This hobby gives countless opportunities for changing ideas! After some thought, have decided to try another approach. Whilst brushless motors give fantastic performance; so far have had poor experience of system reliability. As more information and advice from other modelers is gathered, suspect have been using undersized ESCs, accounting for many of the problems. However, whilst still waiting for the new brushless motors an idea developed. To instal a brushed motor on the centre shaft, whilst retaining brushless on the outers. My thinking is this could provide several advantages such as; a better slow speed performance more suitable for manoeuvring, lower current draw, improved fuse life and a reliable BECC output. it will also operate at below the Li-Po cut-off voltage, giving a “get home” facility in the event the brushless ESCs cut-offs operate. However, there is a slight weight penalty as brushed motors and ESCs are heavier than brushless. Fitted a brushed motor of the same O/D and mounting arrangement as the previous brushless to minimize installation issues. With a reliable Mtroniks ESC from my stock and suitable fuses, fitted these items along with the ballast and battery used earlier. Now, back to the pool. The system worked well. The vessel speed is much less than with a brushless motor on the centre shaft, but control-ability greatly improved. With the triple rudders she steers nicely. The thought of using a brushed motor on the centre shaft, with a brushless motor on each of the outers is attractive. it is hoped the additional operation of the outers in conjunction with with the centre shaft, will provide the expected performance. The centre shaft would then also provide manoeuvring and reliability with the outers shut down. If this works, think this power-train combination could be ideal. Once the new brushless motors and ESCs arrive will instal and report. On the attached pictures, the first shows the ballasted model sitting with the brushed centre shaft motor, the second with a brushless. The difference in draft is imperceptible, the bow sits slightly high in both cases. The third shows the model with the brushed centre shaft operating only at “full” speed.



model-boats.com

19th Aug 2018

BRAVE BORDERER

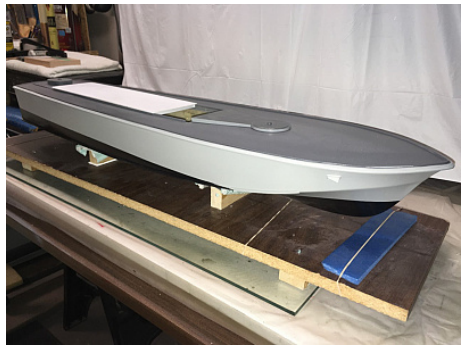
Blog 4 update – Adjustable transom flap using metallic tape did not work. Think the vibration caused flexing and fatigue, so it finally split. Fortunately had established the correct angle, so reproduced the flap arrangement with a fixed thin alloy plate. Much more robust. Have installed the new brushless motors and ESCs. The current layout is brushless motors on the outer propellers and brushed on the centre, all powered by a single 3S Li-Po battery and Rx. Am hoping to commence water trails this week, but have found an issue which was also present with the original brushless motors. When either brushless motor is powered up it operates nicely, however, as soon as the second motor is started either motor “stutters” and a pronounced “squeal” can be heard. The brushed motor is unaffected. Have now tried several ESCs but to no avail, the issue remains. It can be cured though by powering each brushless motor with it's own battery. When this is done everything powers up cleanly and quietly. The obvious solution is to use two Li-Po batteries and abandon the single battery approach. Am reluctant to do this as the model weight will increase yet again. Has anybody experienced this when using twin brushless motors and, if so, how was it resolved?

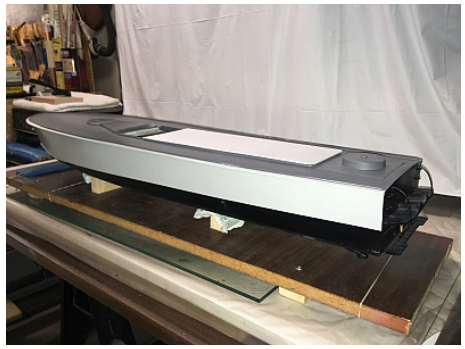
Model Boats Website!

19th Oct 2018

HMS BRAVE BORDERER

The weather has quickly turned colder, giving an excuse to get back to this model. Stripped out much of the interior and the prop. shafts to replace the nylon propellers with brass. These items all needed removing for painting, so decided to paint the hull before reassembly and then moving onto the superstructure. Fortunately, examining similar naval vessels and several U Tube videos, confirmed the hull as light grey, the deck a darker one of the 50 shades of grey and the lower hull below the waterline black. Used thin Tamiya masking tape to define clean colour separations, followed by regular tape, masked the hull into colour sections and sprayed using “rattle” cans. After the colours applied a light overall Matt coat to subdue any shine. The results are satisfactory. Will now reassemble and move onto building the superstructure and the other fittings. Prior to the season closing decided to experiment with my new Flysky Tx/Rx package, shortly to be fitted to this model. This Tx has a servo limiting function, which was hoping could also be used to restrict ESC output. Would like to make the full speed motor response correspond to full Tx control position. Currently can over power the model; which lifts the stern, causing it to come off the plane and then dig the bow in. Was thinking that if full throttle could be set at around 90% forward control movement and 40% sternwards the model would retain adequate performance, but without being overpowered or very sensitive to control lever movement. As the Brave was not available, tried the idea on my Daman Stan 4207 model. This is brushed motor powered and a good performer. Obviously the settings for the Brave will be different, but at least could try to see if the idea would work – it did! This Tx function is easy to use and adjustments can be made whilst the model is on the water. Once the ideal settings are achieved they can be programmed and then retained in the Tx. Will try this on the Brave when back on the water next Spring.



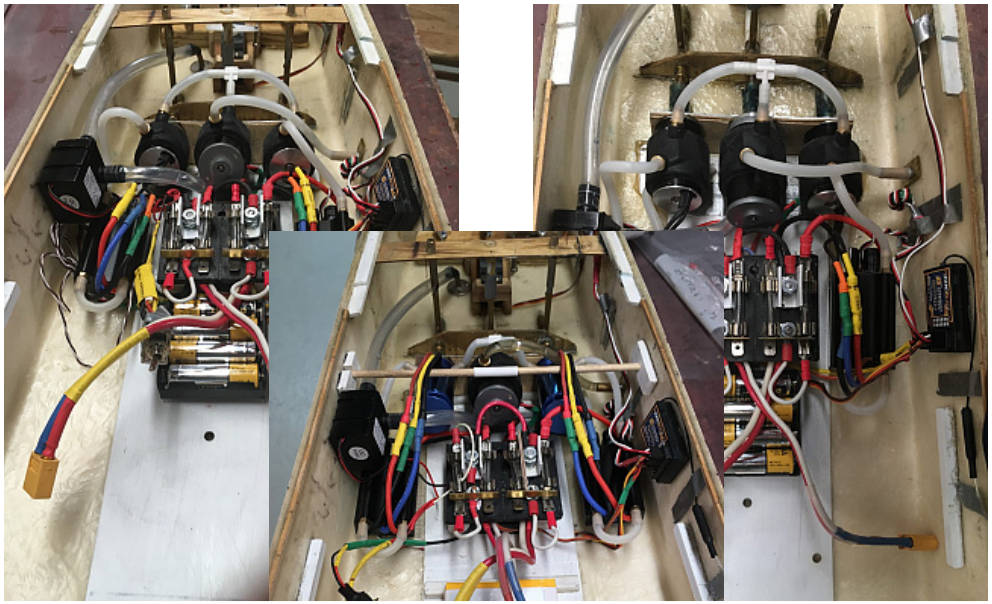


model-boats.com

25th Sep 2018

BRAVE BORDERER - BRUSHLESS SUMMARY

Although have modeling experience, all my earlier vessels used brushed motors. This was my first brushless. The model is now running well, but thought, for the benefit of others considering this transition to summarize my experiences. Must stress the performance of a brushless motor is incredible when compared to a similar sized brushed; for a vessel such as this they are almost obligatory. They are worth the trouble! Had been advised that the best powertrain installation for a 37" Brave Borderer is either a single or twin screws, not three. This was good advice! Much heartache could have been avoided with a single screw installation. Unfortunately, that is not the correct layout for a scale builder. Tried three major powertrain iterations, with several variations within each group. All motors are 28mm O/D : 1) The original installation used 3 x 4600kV inrunner motors with 30 A ESCs. Had bought these items used. The motors were too fast and had little torque. The ESCs also did not have adequate capacity. The result was erratic performance, a high fuse failure rate and the eventual failure of an ESC and motor Picture #1. 2) First upgrade was to 2 x 2400kV inrunner motors, using 50A capacity ESCs. The centre shaft was fitted with a brushed motor. This combination did work, although suffered greatly from motor "squeal" and "stutter". Eventually a motor burnt out and failed. Picture #2 3) Upgrade two: retained the 50 A ESCs, with 2 x 2600 kV outrunner motors, again with the brushed inner shaft motor. Reprogrammed the ESCs to soft start parameters. Much better, performance and reliability can now be considered acceptable. The squeal and stutter are largely corrected it has justified the challenges of getting here. Picture #3 Have tried both 2 and 3S Li-Po batteries, suggest use the minimum voltage needed to achieve the desired performance. Higher voltages translate into faster response and performance, but with less control modulation. The model can be easily overpowered. In summary, from my experience. For a marine application; chose low (under 2000kV) kV rating motors with an outrunner layout wherever possible (produce more torque than inrunners). Use ESCs with a ratings comfortably in excess of the motor ratings, fit fuses to supplement any ESC protections. Ensure the ESCs are programmed to "soft start" characteristics. Also, the obvious check of making sure shaft alignment is correct is even more important with the higher speed capability of brushless motors. in spite of the trails, cost and tribulations of getting here. Have enjoyed the challenge and the end result does justify the means. Also, do not finally fit the deck until you are satisfied with the performance. Making the changes described with limited access would have been very difficult and frustrating.



Model Boats Website!

29th Aug 2018

BRAVE BORDERER

Decided to separate the two power systems; one to the port ESC and motor and the other the starboard. Hope this will reduce interference between the motor systems. Have also reverted to a remote battery powered Rx rather than the BECC system, again to reduce possible interference. The modifications did not resolve the problems. The squeal and stutter are still present, but much reduced. Sounds rather like a slipping coupling, but as these have been checked many times they can be eliminated. Apart from the squeal and the stutter, everything works well. The squeal /stutter occurs at start up, when it happens the control is returned to neutral, if the motor is immediately reselected, usually the problem goes away and the motor runs up cleanly. it only occurs when both motors are selected at the same time. Either runs up cleanly when selected individually. Interestingly enough, did some research on various Model Boats site and found some references to RF interference, no specific solutions though. Also examined some Aero modeling sites as they use powerful brushless motors with ESCs. There is some history of the problem there. Evidently when the mosfets (?) of the ESCs convert DC to AC, RF interference is generated. it can often be addressed by using ferrite rings on the ESC control leads. My latest ESCs actually have ferrite rings, so the problem must have been anticipated. This might account for the latest reduction in squeal and stutter levels. Am at a loss to think of any other modifications, so decided to conduct a water test. Maybe it is a characteristic of brushless motors, but their control response seems "ragged", not smooth as with a brushed. Anyway, the squeal and stutter seemed reduced yet again, perhaps the water load damped them down. Was able to start exploring both the performance envelope and the viability of the brushed centre shaft motor. First impressions are that on a 2S battery the performance is fine, but it sparkles on 3S. On 3S the stutter and squeal are more pronounced though. intend to do further trials but, unless something unexpected occurs, now plan to use 2S power. The centre brushed motor idea works well, this layout seems a good compromise. Will design a simple switching circuit to ensure the brushless motors can selected separately. This will avoid the inadvertent operation of both brushed and brushless unintentionally as they are on the same control stick. The brushed can then be used for low speed operation. Returning to the problem of squeal and stutter – has anybody else experienced this and how was it resolved?

11th Sep 2018

BRAVE BORDERER

Been researching the squeal and stutter on other websites and conclude RFI is probably not the major contributor. Others attribute it to a mismatch in the ESC / motor timing, which seems more likely. Whatever caused it, resulted in the affected motor failing. Which came first, the failure causing squeal or squeal causing failure is open to conjecture. Much to my surprise the manufacturer has decided to replace the motor under warranty. In the meantime, the motors I had planned to use originally (2800kV Outrunners) came into stock, so purchased a couple. Until now have had to use the ESC default settings as did not have a programming card. This also arrived with the motors. Following advice from another contributor reprogrammed the motors with “softer” start and acceleration settings. Fitted and tried the new motors and settings. On the bench, the squeal and stutter have almost gone. The motors are also more tractable. As the brushless motors are now going to be used for high speed operation only, with slow on the centre brushed, thought could simplify the controls by putting the brushless ESCs on one control system using a “Y” lead. However, this introduced inconsistent and erratic motor responses. Reverted to the two previous separate controls, port and starboard. On the water the performance is fine, as is the reliability. The 2S battery gave almost half an hours operation. The bow lifts nicely with both 2 & 3 S Batteries; plenty of spray. Hopefully resembling a 50 knot vessel! Another adjustment is needed to the transom flaps to try to hold the bow down later as she accelerates. Feeling now to finally be making progress with this model. The squeal has not gone, nor has erratic motor operation. The squeal is high pitched screech, rather like treading on a budgie! When it happens, bringing the control back to neutral and advancing it again almost always overcomes it. The erratic operation happens also when starting and is rather like the motors are not getting a signal to react to the control. Again, returning through neutral briefly seems to correct it. The revised motors and ESCs have increased the weight to 6lbs for the hull including all running gear, excluding batteries and superstructure. Whilst still trying to control weight have concluded this figure is satisfactory as the performance certainly is.

Model Boats Website!

21st Sep 2018

HMS BRAVE BORDERER

Adjusted the transom flaps and reprogrammed the ESCs to the softest start settings, retested. Until now, the test runs did not have the duration or stability to really examine what was happening. Using 3 S batteries acceleration is rapid and a is plane quickly achieved. However, as the acceleration continues and speed increases, the bow digs in. A cloud of spray then surrounds the model as the plane is lost. Brushless motors do not modulate as smoothly as brushed and adjusting power tends to be erratic or exaggerated. This is a scale model and the propeller shaft angles are per the plans. The thrust from the propeller has two components, horizontal and vertical. The horizontal propels the vessel forward. However, the vertical component forces the stern upwards and, correspondingly, the bow down. Have moved as much weight as possible towards the stern to counteract this, limited by maintaining the correct displacement and waterline. The easiest solution is to reduce motor power, decreasing both speed and the lifting component. Decided to retry the 2S batteries as they give reduced power. A plane is again achieved, but as the motor response is more docile, it can be controlled. if the speed gets too high the bow lowers, as before, but the motor output can be more easily adjusted. Spent a pleasant half hour or so with the vessel accelerating onto and off a nice, controllable plane. Much less spray and drama than with 3S and much more controllable. Have now decided to revise plans and use 2S rather than 3 batteries. A further advantage is the motor noise is muted and now sounds more like a gas turbine than a dental drill! Finally feeling comfortable with the model. Will thus shelve further building until the late fall when sailing in Canada concludes. Want to enjoy the rest of my fleet in the meantime! Will summarize my experiences with brushless motors in another blog shortly for the benefits of others contemplating their use. After restarting the model will resurrect periodic build blogs to advise progress.

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