

MOTORWORKS SUBMARINE MODIFICATIONS



PART I – STANDARD SUBMARINE OPERATION AND SETUP – NO MODIFICATIONS.

IF YOU WISH TO MODIFY YOUR SUBMARINE FOR DEEP OPERATIONS (BELOW 3 METERS) SKIP TO PART II

PLEASE FOLLOW THESE INSTRUCTIONS STEP BY STEP TO AVOID PROBLEMS WITH YOUR RC SUBMARINE.

SPECIAL CONCERNS ARE NOTED IN UNDERLINED ITALICS UNDERLINING AND IN RED!!

- 1.REMOVE SUB AND TRANSMITTER FROM PACKAGE;
- 2.SET ON DISPLAY STAND;
- 3.TURN SUBMARINE OVER.
- 4.REMOVE BATTERY COVER. TWIST EACH SCREW OFF, ALTERNATING BETWEEN SCREWS TO INSURE EQUAL PRESSURE ON BATTERY COVER SEAL. AFTER REMOVAL, RUN YOUR FINGER OVER THE HATCH COVER EDGE TO SEE IF THERE ARE ANY PLASTIC MOLDING SPURS OR BUMPS. IF SO, USING LIGHT SAND PAPER AN EMORY BOARD, GENTLY, GENTLY SAND FLAT.



5. CAREFULLY REMOVE BATTERY HOLDER FROM SUB. INSTALL 4 AA

AKALINE BATTERIES IN BATTERY HOLDER. RECHARGEABLE BATTERIES ARE TOO HEAVY WITHOUT ADDING ADDITIONAL STYROFOAM (FRONT AND REAR) IN THE SUB;

6. INSURE BATTERIES ARE IN CORRECTLY AND REPLACE BATTERY HOLDER IN SUB. PLACE SCREWS BACK IN THE BATTERY HOLDER THE SAME WAY THEY CAME OUT;

ON/OFF SWITCH FOR SUB IS UNDER THE SUB IN THE FRONT.

ALWAYS GENTLY PRESS THIS ON/OFF SWITCH SO AS NOT TO TEAR IT. PRESS IT NOW TO TEST YOUR BATTERIES. A LIGHT SHOULD COME ON IN THE SWITCH. IF NOT, RECHECK HOW YOU INSTALLED YOUR BATTERIES;

7. PLACE SUB IN YOUR BATHTUB AND HOLD SUB UNDER THE WATER;.

8. TURN THE SUB COMPLETELY OVER, LEFT AND RIGHT, FORWARD AND BACKWARD UNTIL ALL OF THE AIR BUBBLES ARE GONE. DO THIS 3-4 TIMES...VERY CRITICAL TO GET A PROPER BALANCE. SEE ATTACHED PHOTO WHICH SHOWS A USS SEAWOLF FLOATING IN THE PROPER POSITION WHEN LAYING STILL IN THE WATER;



9. RELEASE SUB AND LET IT FLOAT TO THE SURFACE ON ITS OWN;

10. THE WATER SHOULD BE ½ WAY UP THE SAIL OF THE SUB (THIS IS THE CONNING TOWER OR THE TALL EXTENSION COMING OUT OF THE TOP OF THE SUB);

11. THE SUB SHOULD SET LEVEL IN THE WATER (CHECK CAREFULLY);

12. IF THE SUB DOES NOT SET LEVEL, YOU WILL NEED TO BALANCE THE SUB SO THAT IT SETS IN THE WATER AS IN 13, 14 ABOVE;

13. USING THE SMALL WEIGHTS PROVIDED WITH YOUR SUB, ADD WEIGHTS AS NECESSARY TO THE FRONT BOW PLANES OR REAR PLANES OF THE SUB. THE PLANES ARE REMOVEABLE. SQUEEZE THE PLANES NEAR THE SUB WITH YOUR FINGERS AND PULL OUTWARD. THE DIVING PLANES WILL COME OFF THEN. BE CAREFUL, YOU MAY HAVE TO REALLY SQUEEZE THEM HARD. YOU WILL

BE ABLE TO SEE THE END WHERE YOU SLIDE IN THE WEIGHTS. GO LIGHT (SMALLER) THEN TRY HEAVIER WEIGHTS AS NEEDED;

14. FOR EXAMPLE, IF THE FRONT OF THE SUB IS AT THE SURFACE OF THE WATER AND THE REAR OF THE SUB IS HANGING DOWN IN THE WATER TOO MUCH..ADD A SMALL WEIGHT TO THE LEFT/RIGHT DIVING PLANES (IN THE FRONT)...THIS WILL BRING THE FRONT DOWN AND THE REAR UP. ADD MORE WEIGHTS AS NECESSARY.

15. OCCASIONALLY, A SUB CANNOT BE BALANCED WITHOUT ADDING STYROFOAM IN THE INTERIOR OF THE SUB DUE ITS CONTINUING TO SINK DOWN UNDER THE WATER TOO LOW. ..IF THIS HAPPENS, DO THE FOLLOWING:

A. CUT 3-4 SMALL PIECES OF STYROFOAM FROM ANY BOX THAT USES STYROFOAM AS PACKING (DO NOT, DO NOT USE THE THE KIDS POOL “NOODLES” AS THAT TYPE OF FOAM COLLECTS WATER AND YOU WILL LOSE YOUR SUB TO THE DEPTHS).

CUT THESE PIECES IN A CIRCULAR FASHION THAT MATCHES THE CURVATURE OF THE HULL. THESE PIECES SHOULD BE THIN (NO MORE THAN ¼ INCH THICK) AND NO WIDER THAN ABOUT ½ INCH (THERE ARE A FEW AREAS YOU CAN CUT AND INSTALL SMALL SQUARE BLOCKS OF STYROFOAM IF YOU NEED MORE BUOYANCY).

B. WITH THE SUB HELD UNDER THE WATER, SHAKE AND MOVE AGAIN, INSURING ALL OF THE AIR BUBBLES ARE OUT (CRITICAL).

C. LOOK AT HOW THE SUB RIDES IN THE WATER AND DECIDE WHICH END(S) NEEDS TO RISE TO MAINTAIN THE PROPER LEVEL.

C. PLACE A PIECE OF THE STYROFOAM UNDER THAT AREA OF THE SUB WITH YOUR FINGERS AND SLOWLY RELEASE THE PIECE OF FOAM SO THAT IT STAYS AND BALANCES UNDER THE SUB (DO NOT PUT IT UNDER THE VENT OPENING FOR THE DIVE/SURFACE MOTOR LOCATED UNDERNEATH THE BOAT).

YOU WILL NOTE THAT THE SUB HAD BEEN LIFTED MORE OR LESS BY THE PIECE OF FOAM;

D. IF THE SUB IS TOO HIGH IN THE WATER WITH THAT PIECE OF STYROFOAM, CUT IT DOWN IN SIZE AND TRY AGAIN;

E. THEN, ONCE THE CORRECT BALANCE IS ACHIEVED, TURN THE SUB OVER AND LOOSEN THE 5 SCREWS THAT HOLD THE SUB TOGETHER. ALSO LOOSEN THE TAIL CONE SCREWS THAT ARE ON THE TOP AND BOTTOM OF THE REAR CONE PIECE;

G. REMOVE THE CONE GENTLY, BEING CAREFUL NOT TO HIT THE PROP OR PROP SHAFT;

H. PUT THE SUB ON ITS STAND AND GENTLY PULL THE PLASTIC SUB TOP COVER OFF. LOOSEN ANY SCREWS THAT STILL MAY BE HOLDING THE SUB;

I. INSTALL THE SYTROFOAM IN THE LOCATION YOU PLACED IT UNDER THE SUB...DO NOT PLACE UNDER OR OVER THE DIVING MOTOR PROPELLAR OR IN THE IMMEDIATE VICINITY;

J. AFTER PLACING YOUR STYROFOAM PIECES(S), REPLACE THE TOP COVER OF THE SUB BY SLOWLY PRESSING IT DOWN UNTIL THE SCREWS CAN BE TIGHTENED TO HOLD THE TOP AND BOTTOM TOGETHER. BE CAREFUL NOT TO DAMAGE THE PROP OR THE SHAFT;

K. PLACE THE BOAT BACK IN THE WATER AND GET THE AIR OUT AS PREVIOUSLY DESCRIBED ABOVE. CHECK FOR BALANCE. REPEAT THESE STEPS

AS NECESSAR.

16. ONCE THIS BALANCE HAS BEEN ACHIEVED WITH THE BOAT, YOU ARE ALMOST READY TO GO TO SEA WITH THE STOCK SUB;

17. INSTALL A 9V BATTERY IN THE TRANSMITTER. THIS CAN BE A RECHARGEABLE BATTERY, ALKALINE OR COPPER;

18. TURN POWER ON IN SUB AND TRANSMITTER. PLACE SUB IN THE WATER, GETTING THE AIR BUBBLES OUT;

19. TO DIVE THE BOAT, HOLD THE DIVE BUTTON DOWN. THE DIVE MOTOR WILL BEGIN TO PULL THE BOAT UNDER THE WATER. AFTER A FEW INCHES THAT THE BOAT TRAVELS DOWNWARD, PRESS THE FORWARD BUTTON. ALTERNATE EVERY FEW SECONDS OR SO BETWEEN DIVE AND FORWARD TO KEEP THE SUB UNDER THE WATER. YOU CAN DO ALL MANUVERS LIKE THIS WHILE ALTERNATING PRESSING THE DIVE BUTTON. A DEPTH OF UP TO 3 METERS IS RECOMMENDED WITH THE STOCK SUBMARINE;

19. AGAIN, FOR ANY UNDERWATER MANUVERS YOU DO, BE SURE TO PERIODICALLY PRESS THE DIVE BUTTON TO KEEP THE SUB UNDER THE WATER;

20. PRESS ONLY ONE BUTTON AT A TIME OR YOU WILL RUN YOUR BATTERIES DOWN;

21. THE SUB, IF BALANCED CORRECTLY, CAN SURFACE SLOWLY BY ITSELF OR YOU CAN PRESS THE SURFACE BUTTON;

****DO NOT EXCEED 3 FEET OR SO DOWN WITHOUT MODIFICATION TO DO SO, CAN RISK LOSING YOUR SUB. WITH THE MODIFICATIONS PROVIDED IN THIS MANUAL, YOUR SUB CAN ACHIEVE DEPTHS OF OVER 10 FEET (SOME HAVE TAKEN THEM TO 30-50 FEET, BUT THAT IS FOR THE BRAVE OF HEART). HERE ARE THE RECOMMENDED MODIFICATIONS:**



PART II - MODIFICATIONS FOR EXTENDED SURFACE RANGE AND DEEPER DIVING (MODIFYING THE STANDARD SUB)

WE RECOMMENDED YOU PURCHASE (1) 9 VOLT, (8.4volt, 150mAh) RECHARGEABLE BATTERY FOR THE TRANSMITTER AND 4 2500mAh AA RECHARGEABLE BATTERIES FOR THE SUB.

****IF YOU USE THE 2500NIMH AA RECHARGEABLE BATTERIES FOR THE SUBMAKE ,**

MAKE SURE THAT ANY BALANCING DONE TO ACHIEVE THE PROPER FLOAT LEVEL IS DONE WITH THE RECHARGEABLE BATTERIES INSTALLED. THEY ARE HEAVIER THAN THE ALKALINE OR THE COPPER BATTERIES!!!!

ONE YOU BALANCE THE SUB WITH THESE BATTERIES, TAKE A BLACK PERMANENT MARKER AND MARK THE BATTERIES POSITION WITHIN THE BATTERY BOX. DRAW 2 BLACK LINES ACROSS EACH OF THE BATTERIES AND MARK THE TOP TWO BATTERIES AS 1 FOR THE TOP SECTION AND 2 FOR THE BOTTOM SECTION OF THE BATTERY BOX HOLDER. PLACE THE BATTERIES BACK IN THEIR HOLDER THE EXACT SAME WAY USING THE MARKS TO ALIGN THE BATTERIES. THIS WAY, YOU WILL AVOID GROSS REBALANCING PROBLEMS!!

(1)MODIFICATION 1 – SEALANT MODIFICATION.

SEE PHOTOS:

1. PURCHASE GE SILICONE II RTV CLEAR SEALANT WITH AN INEXPENSIVE CAULKING GUN FROM HOME DEPOT OR LOWES;
2. REMOVE TOP SUB PLASTIC COVER AND ALL STYROFOAM FROM SUB. BE CAREFUL TO PLACE THE FOAM THAT YOU REMOVE BY ITS LOCATION ON THE SUB SO YOU CAN RETURN IT THERE EASILY;
3. LOOK CAREFULLY AT EVERY SEAM AND WHERE HOSES ARE ATTACHED. SILICONE EVERY SEAM AND HOSES WITH A THIN COAT OF SEALANT WITH A VERY SMALL PAINT BRUSH. YOU WILL NOTICE 2 SCREWED DOWN SUPPORTS FOR THE VARIOUS MOTORS. UNSCREW THESE AND LIFT THE MOTORS OUT AND SEAL UNDERNEATH THEM ALSO. PHOTOS SHOW WHERE TO APPLY SEALANT.





4. DO NOT GET ANY SEALANT IN THE PROPELLARS OR THE OPENING THAT THE PROPELLAR GOES INTO;

5. CLEAN AWAY ALL EXCESS;

6. INSURE YOU SILICONE TOP AND BOTTOM OF ALL SEAMS. WORK SLOWLY AND CAREFULLY. THE BLACK ROUND RECEIVER IN THE FRONT OF THE BOAT MUST ALSO BE SILICONED TOP AND BOTTOM;



7. REPEAT THE PROCESS FOR ADDING STYROFOAM TO THE BOAT. BE ADVISED THAT YOU HAVE JUST ADDED WEIGHT BY ADDING THE SILICONE. WARNING: YOUR BOAT WILL SINK WITHOUT ADDING STYROFOAM AFTER THIS MODIFICATION.

8. LET THE SEALANT DRY OVERNIGHT BEFORE PLACING BOAT IN THE WATER.

**FOR DEPTHS BELOW 20 FEET: YOU MUST PULL ALL HOSES OFF FROM THEIR CONNECTION, SILICONE INSIDE THE HOSES (COMPLETELY AROUND IT) AND PLACE THE HOSE BACK ON ITS CONNECTION. THEN, SILICONE OUTSIDE THE HOSE COMPLETELY AROUND IT. OTHERWISE, THE PRESSURE WILL POP THESE HOSES OFF AND YOUR SUB WILL SINK.

(2) MODIFICATION 2. RECEIVER ANTENNAE MODIFICATION.

SEE PHOTOS ATTACHED TO THIS EMAIL.

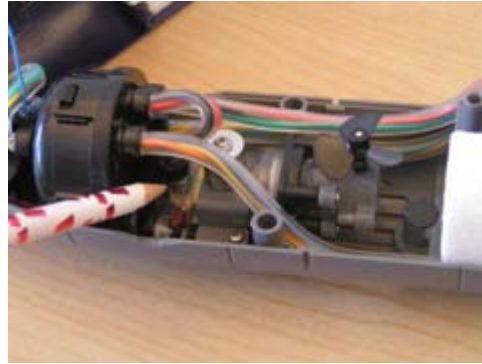
32. ANTENNAE MODIFICATION: FOR THE GREATER DEPTHS, YOU WILL NEED TO LENGTHEN THE RECEIVER ANTENNAE.

A. GO TO THE LOCAL HOBBY SHOP AND ASK FOR A FLEXIBLE RC ANTENNAE.

THIS WILL LOOK LIKE A BLACK WIRE WITH A PLASTIC COVER AROUND IT.

B. REMOVE THE TOP COVER OF THE SUB.

C. THE RECEIVER IS IN THE FRONT AND IS A BLACK ROUND LARGE CYLINDER WITH A BLACK WIRE (ANTENNAE COMING OUT OF IT).



D. DOUBLE THE LENGTH OF THE ANTENNAE. PEEL BACK ABOUT 1 INCH ON EACH PIECE (CAREFULLY SO AS NOT TO CUT THE ANTENNAE) AND SPLICE THE ENDS TOGETHER. TWIST THE BARE WIRES TOGETHER.

E. RUN THE NEWLY SPLICED ANTENNAE THROUGH THE HULL LENGTHWISE.
g.

G. RUN THE ANTENNAE FROM THE RECIEVER UNDERNEATH THE STYROAOM PIECE THAT IS NEAR THE SUBS SAIL EXTENSION OR CONNING TOWER.

H. MAKE A LONG LOOP WITH THE ANTENNAE RUNNING DOWN THE LENGTH OF THE TOP COVER OF THE SUBMARINE. DO NOT OVERLAP ANY PART!!

I. RUN THE END BACK UNDERNEATH THE TOP COVER STYROFOAM AND OUT THE SAIL THROUGH THE REAR MOST HOLE. ABOUT 3-4 INCHES SHOULD COME OUT OF THE HOLE.

J. SILICONE THE BARE WIRES THAT YOU TWISTED TOGETHER SO THAT NO PART IS OPEN TO THE WATER. SILCONE TO THE TOP COVER OF THE SUB.

K. LIGHTLY, LIGHTLY SILICONE THE END OF THE ANTENNAE COVERING THE TINY BARE METAL PART.

MODIFICATION 3. TRANSMITTER MODIFICATION

**THERE ARE 2 TYPES OF ANTENNAE YOU CAN USE ON YOUR SUB.

A. THE TELESCOPING ANTENNAE;

B. THE FLEX ANTENNAE



****BOTH CAN BE PURCHASED FROM RADIO SHACK**

****PLEASE FOLLOW THESE PROCEDURES CAREFULLY**

(1)THE TELESCOPING ANTENNAE

- A. REMOVE THE 4 SCREWS HOLDING THE BACK COVER OF THE TRANSMITTER.
- B. AFTER REMOVING THE BACK COVER BE VERY CAREFUL WITH THE GREEN PUSH BUTTONS, THEY FALL RIGHT OFF.
- C. REMOVE THE OLD ANTENNAE WIRE BY LOOSENING THE SCREW THAT HOLDS IT.



- D. LAY THE TELESCOPING ANTENNAE'S OPENING AT THE BOTTOM OF THE ANTENNAE OVER THE PART WHERE THE SCREW HELD THE OLD ANTENNAE. ANOTHERWORDS, YOU ARE PLACING THE ANTENNAE WHERE IT WILL BE WHEN THE COVER IS CLOSED. NOTICE THAT THE ANTENNAE ANGLES OUT OF THE PLASTIC DUE TO ITS SIZE. YOU WANT THE ANTENNAE TO LAY FLAT IN THE TRANSMITTER.



E. TAKE A ROUND FILE AND FILE A SMALL ROUND GROOVE IN THE TRANSMITTER HOUSING IN ORDER TO LAY THE ANTENNAE FLAT. WORK SLOWLY, CHECKING WITH THE ANTENNAE EVERY FEW MOMENTS. YOU WILL HAVE TO FILE IN 2 DIFFERENT PLACES.

D. WHEN THE ANTENNAE IS FLAT, PLACE A VERY SMALL NUT WHERE THE SCREW WAS OR THE ANTENNAE WILL STILL ANGLE TOO MUCH AND WILL NOT READILY FIT INTO THE SUB TRANSMITTERS HOUSING.

E. RETIGHTEN THE SCREW THAT HOLDS THE ANTENNAE IN PLACE.

F. REPLACE THE COVER WITH ANTENNAE INSTALLED AND MAKE SURE YOU HAVE ALL OF THE GREEN BUTTONS PROPERLY ALIGNED (ESPECIALLY THE DIVE AND SURFACE BUTTONS) WHEN YOU SCREW THE COVER IN. PLACE. WORK SLOWLY HERE.



(2) THE FLEX ANTENNAE

A. REMOVE THE 4 SCREWS HOLDING THE BACK COVER OF THE TRANSMITTER.

B. AFTER REMOVING THE BACK COVER BE VERY CAREFUL WITH THE GREEN PUSH BUTTONS, THEY FALL RIGHT OFF.

C. REMOVE THE OLD ANTENNAE WIRE BY LOOSENING THE SCREWS THAT HOLD IT.

D. YOU WILL HAVE TO PULL OUT AND STRAIGHTEN AT LEAST 2 COILS FROM THE FLEX ANTENNAE OR IT WILL NOT READILY FIT INTO THE SUB TRANSMITTERS HOUSING.



- E. RETIGHTEN THE SCREW THAT HOLDS THE FLEX ANTENNAE IN PLACE.
- F. MAKE SURE YOU HAVE ALL OF THE GREEN BUTTONS PROPERLY ALIGNED (ESPECIALLY THE DIVE AND SURFACE BUTTONS) WHEN YOU SCREW THE COVER IN PLACE. WORK VERY SLOWLY HERE.

Modification 4: Voltage Mod:

- 1. Remove the 2 small screws to open this terminal battery compartment. There are 3 wires, BLACK, GREEN & RED. (2nd pic.)



- 2. **Note: Use a 25-40 watt desoldering iron for this task.** Desolder the RED wire from it's terminal & resolder it with the GREEN wire terminal. (4th pic) The GREEN wire supplies the power to the sub's receiver. **Be careful when doing this... you may burn your fingers or melt critical plastic in the battery compartment!**

- 3. **The RED wire is the POWER terminal for the sub's 3 drive motors!** The stock wire set up LIMITS the supply voltage to the motors to only 4.0 volts (if you are using 4 X 1.2 V batts.) & 4.5 volts (if you are using 4 X 1.5 V batts.) The wiring re-configuration done here boosts the power supply to the sub's motors to 6.0 Volts.

NOW YOU ARE READY TO GO ON PATROL!!

-Edited by CaptainNemo12 19/01/07

-Photo Source: RCU Submarine Forum