Rowboat Motor Journal

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Southern Ontario Rowboat Motor Chapter

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Long-time AOMCI member Bob Grubb runs his 1920 Amphion at the 2008 Tomahawk Mini-Nationals.

This motor is a very smooth runner that can be started in neutral. A friction-type clutch enables engagement of the propeller drive. The Amphion flywheel spins counter-clockwise, which is the opposite to most any other rowboat motor.

About "The RBM Journal"

The Rowboat Motor Journal was created in order to provide rowboat motor-related information to any and all interested parties, as well as be used as a means of communication between collectors of the early motors that form the foundation of the marine outboard engine industry as well as the original building blocks upon which our hobby is based. Intended for bi-monthly publication, it is a non-profit enterprise with all information (technical or otherwise) procured, verified within reason for accuracy, and assembled strictly through the work of volunteers.

To that end, participating members are encouraged to share their expertise and understanding so as to assist in the future preservation of not only the motors themselves, but the knowledge there-of. Members may be solicited by the Editor to assist with providing in-sight with respect to restoration techniques, part reproduction, shop practices, motor information and any other pertinent exchange of data, up to and including publication of donated pictures or images, detailed accounts of current restoration projects, recent "new" old motor discoveries or acquisitions, or pictorial demonstration(s) of rowboat motors on display or in actual use.

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From The Editors Desk….

The first edition is in the books, and I'd like to thank everyone who was interested enough to participate in reviewing the newsletter and joining the chapter.

Some suggestions were received with respect to items for inclusion in the Newsletter, and I thank the folks who took the time to contact me with their particular concerns.

One question dealt with torque values for fasteners on the Evinrude Detachable Rowboat Motors. Since I did not uncover a specification list to cover this item directly, I've stolen some data and welded a page together that can be used as a reference. It covers most grades of steel fasteners that you're likely to encounter while working on rowboat motors, or many other mechanical devices for that matter. It lists recommended torque limits of fasteners ranging from 10-24 all the way to 1"-12 tpi; and lists torque values for grades 2, 5, 7 and 8 steel fasteners. Hopefully it's of some use to chapter members.

Continuing on with the series of "what to look for" in your rowboat motor, we take a long hard look at the carburetor or mixing valve part of the engine. For those long-time members who have back issues of the "Outboarder", there is a good piece written by Marcus Wright III that was printed in the October 1970 issue of the AOMCI magazine. This issue was also made available on the CD-ROM that was put together by AOMCI members several years ago, and is also available on Skip Hagerman's website. His URL is http://www.antiqueoutboardmotor.info/ao.html and Marcus Wright's article entitled "**Crankcase Valve Springs And Lift Distances**" can be found at the following web address; http://www.antiqueoutboardmotor.info/Outboarder/1970/oct70-22.html I advise you to have a look there if you have some time to read through it. Mr. Wright did a great job of describing the function of the poppet valve spring and getting it set up to optimize motor performance.

Thanks to the efforts of Dick Gorz, the Rowboat Motor Discussion Board has been up and operating since early September. Traffic level on the board is about what I would have expected at this point. While the formation of this chapter was posted on the AOMCI Discussion Board, email response to that advertisement was fairly light; even so, through the combination of the board posting plus word of mouth we have managed to enlist the names of some 50 of us who enjoy the rowboat motor aspect of the hobby. Time will tell just how many more will gravitate over to join us, but I must say I'm quite pleased with the response and support shown thus far. There are some things in the pipeline that may assist in furthering the growth of this chapter.

At such time as I receive the formal charter from the AOMCI First Vice-President, I'll request the AOMCI Webmaster to add our chapter website to the link page "Local Chapters" section. At the same time, we should be seeing the RBM Chapter added to the roster in the Outboarder as well as the AOMCI Directory. I think the overall effect will be that this will probably draw in a few folks who haven't heard about us yet.

If you haven't heard already, Jason Harrison's rowboat motor website is now off the map. For unspecified reasons, Jason decided to let the rights to his domain name expire; thus the website was shut down. What Jason has generously offered to do is to provide 100% of the data contained on his website to the Rowboat Motor Chapter to use as we see fit. Dick Gorz has offered to review the material and find web space that would allow us to continue enjoying the many wonderful bits of information that Jason was previously providing. Hopefully by the time the next newsletter is ready to distribute, I'll be able to report that this valuable resource will once again be available for us to refer to.

In the gossip department, Steve Roskowski from Indianapolis scored his first rowboat motor, a mid-teens Lockwood-Ash rudder-steer model… Rick Eichrodt picked up a Caille 5-speed RBM with an Evinrude magneto… Dave Bono traded a Spinaway for a couple of project motors , including a Wisconsin…. Now, what are YOU working on??

What Should One Do with A Newly Acquired Motor? (Rowboat Motor Beginners Guide, continued)

In the previous issue, we looked at going through the majority of the powerhead components with the goal of evaluating overall motor condition. This time we'll continue by looking at the fuel system, focusing especially on carburetion.

The majority of rowboat motors are aspirated by means of a check-valve type of fuel metering device or mixer valve. In several cases (almost all Waterman and Ferro motors, for instance) float feed carburetors are used; they will usually end up being either Scheblers or Kingston four-ball or five-ball carburetors. There are also instances of Evinrude motors using float-feed carburetors, such as the 1916-17 "AA" Four-Cycle Twin, which is a special case that will be discussed later; Tom Goepfrich recently revived a mid-teens Evinrude Detachable that is equipped with just such a four-ball carburetor. There's no nameplate on it, but it sure looks like a carb off an Evinrude "AA". According to an Evinrude catalog from the mid-teens era, float-feed carburetors were available as a dealer-installed option at the customers' request. But, it is probably relatively safe to suggest that most RBM's use the mixer valve apparatus, and if its not up to snuff, you will have a hard time getting your motor to run properly for you, so lets investigate this device first.

The poppet-type mixer valve works on the basic two-stroke principle of atmospheric pressure being less or greater than the crankcase compression. When the piston is moving upwards in the cylinder, crankcase compression is lowered and a draw or suction effect is created, allowing the poppet valve to lift off of its seat, thus permitting fuel to flow through the orifice that is located in the valve seat area. The raw fuel is metered through the valve seat orifice by means of a tapered needle valve, which has a threaded stem, allowing a range of adjustment to permit or restrict fuel flow as appropriate. This fuel is then vaporized into the flow of air that is drawn in along with it, the crankcase region is charged with fuel mix, then the charge is forced into the transfer port area when the piston compresses the air in the crankcase as it travels downward in the cylinder bore and uncovers the ports. The compressed fuel vapor flows into the combustion chamber, while the poppet valve spring helps re-seat the poppet valve and return it to the closed position, maintaining the crankcase seal.

Seems like a pretty simple system, right? What can go wrong here to cause headaches and difficulty for the operator? It's a limited list, but important nonetheless. For starters, take a look at the poppet valve itself. The valve face and its seat need to be smooth and even, so if there is major pitting, scratching, or grooving present, the sealing effect is not going to be sufficient and you're going to have a hard time making the motor run properly. Normally, any undesirable condition in the valve face or seat area can be addressed by lapping the valve and seat with jewelers rouge. In a pinch, a compound made from toothpaste and most any powdered cleanser such as Bon Ami or Comet will do the job quite nicely. Each case is different, so the amount of roughness has to be evaluated and you decide for yourself how much lapping has to be done, if any. If you're in doubt, try using some Prussian blue between the valve face and its seat to verify the fit.

If the valve looks good, the simplest thing to look at next is the poppet valve return spring. The easiest way to describe whether the spring is good or not is if it allows you to lift the valve off of its seat with minimal finger pressure. Some mixers have a spring on the bottom of the valve stem so that it pulls down on the valve; a washer and cotter key keeps the spring in place and maintains spring tension against the underside of the mixer valve body. Some mixers have the spring hidden on the inside of the poppet valve body, which then exerts pressure downwards on the valve head. These springs are held in place by protrusions on the inside of the removable mixer valve cap as well as on the poppet valve head itself. If your spring is missing, and you're in doubt of which type to install, take a look at the bottom of the valve stem. If there is a small hole drilled through the stem, that's usually a sign that you need the "underneath" type of spring. Ergo, no hole in the stem would indicate the internal type of return spring. If your spring is missing, it is simple enough to fabricate one out of brass wire just by wrapping the wire around a pencil or similar round rod and cutting to length, using the finger pressure guide as a gage for determining proper length and tension of the spring.

One more thing about the poppet valve is the stem. Normally the valve stem fits into a hole machined into the mixer valve body, and this hole has to act as a valve guide. It's important for the fit to be fairly snug and not allow the valve stem to wobble all over the place. Excessive side-to-side movement in the valve stem can translate into undesirable movement or wobble of the poppet valve, causing variation in how far the valve opens during the intake cycle, as well as affecting the sealing capability of the valve.

For fine-tuning, opening or closing the needle valve to suit accomplishes adjustment of the mixture to a lean or rich setting. Most mixer valves come equipped with a brass appendage of some type that serves to provide resistance to rotation; this keeps the needle valve in the desired position while the engine is running. Only the earliest rowboat motors were sold without any type of provision for keeping the needle valve in place, so if you don't have an "L"-shaped flat spring or some sort of brass rod that presses against the mixture and keeps it from moving, either you've got a real antique or there is a piece missing from your mixer valve. Early Evinrudes depended on tension from the gland nut and packing to maintain needle valve adjustment. Its best to investigate and make sure your needle valve packing is still in good condition and able to seal around the needle valve stem.

The needle valve is subject to wear and tear; typically, you may find a groove worn into the tapered tip of the needle if a previous operator has been too heavy-handed when turning the needle to the fully closed position. Early Evinrude motors did not have a fuel shut-off valve at the tank, and instead relied on the mixer valve needle to shut off fuel flow when the motor was stopped, so this part often had forces imparted onto it that it wasn't really meant to endure. In addition, the needles were usually made of steel while the mixer valve bodies were brass or bronze, so forcing the needle with excessive pressure presents the possibility of damaging the needle valve seat as well. Steel needles had the capability of rusting or pitting if exposed to moisture, so one needs to verify that the tapered section is smooth, clean, and not bent out of shape. Check the packing material around the needle stem, it needs to be capable of providing a leak-proof seal around the stem as well as resistance to rotation while the motor is operating; if it doesn't, your needle setting will not remain stabilized in the best running position. Any one of these negative conditions can make a good rowboat motor a royal pain in the keister when it comes to trying to make it run, and may necessitate some rehabilitation of your existing needle.

One other item on the mixer valve is adjusting the lift limit screw. On Evinrude RBM's in particular, there is a screw-type of adjustment on the top of the mixer valve cap. The purpose of this adjustment is to limit the amount of poppet valve travel. Too much travel can cause the motor to run poorly, as allowing the poppet valve to rise an excessive distance from its seat will result in poor fuel atomization, but the more typically seen condition involving a mal-adjusted poppet valve travel is not having the valve open enough. Too little travel will not permit adequate airflow; the motor may be hard to start, or won't run at maximum RPM if it does run. The nominal setting for Evinrude rowboat motors is approximately one full turn out from the closed position, and it is usually marked with a stop pin that is inserted into the mixer valve cap for easy reference. Other RBM mixer valves (i.e. Lukenheimer, as used on many Cailles) the poppet valve travel is controlled by a boss on the underside of the cap. Obviously the presents a case where the travel is not so readily adjustable, so it takes some of the guesswork out of the equation.

One last thing about a check-valve type mixer; there is a rare case that utilizes both a float-feed carburetor AND the check-valve feature. This application is found on the 1916-17 Evinrude "AA" Four-Cycle Big Twin, and is made up of a 4-ball Kingston carburetor with a special venturi which contains the fuel check valve that is needed to help seal the crankcase to assist in maintaining adequate crankcase compression. And if there was ever a motor that needed help sealing up the crankcase, it was the "AA" Twin. What a monstrosity of a crankcase configuration it was. If you can lay your hands on a copy of the July 1967 edition of the "*Antique Outboarder*", I urge you to review it and read through Dr. J.L. Smith's description of this motor. If you can't get a copy of the club magazine, try and review the portion of "*Beautiful Outboards*" where Peter Hunn quotes Dr. Smiths' article. His descriptions of the induction system and starting procedure are absolutely priceless; although he was mistaken in assuming that the Solex carburetor his motor was equipped with at the time was the correct original part. We know for a fact that the Kingston check-valve carb is the correct part; it is likely that someone jettisoned the Kingston and tried to make the motor run better with the automotive carburetor. It seems that these motors had a reputation for being cantankerous at the best of times.

Moving forward to float feed type carburetors, these present a person with more complex parts and situations to deal with compared to a simple mixing valve. Carburetor floats in vintage motors are often dried out and shrunken to the point that they can't be saved, and it will be necessary to use modern materials as replacement parts. On a Kingston carburetor, there are brass balls incorporated into the carb body to help meter air flow and assist in venting; these balls must be free to lift off of their respective seats in order to allow the engine to breathe properly when running. Cleaning the balls and the seats with light solvent and a Scotch-brite pad will help clean up any sticky conditions that may prevent problems in this region of the carburetor. Other items of note on Kingston carbs are the various fasteners (almost already beat up by pliers or sloppy-fitting adjustable wrenches), levers for the choke and throttle butterflies (prone to breakage if abused), plier marks on the carb neck (especially if it's the type that screws onto a pipe thread for mounting), and the bottom nut that tightens the fuel float bowl in place (always found in abused condition). Oh yeah, can't forget the primer rods and the main needle valve, and the various packing material around the needles and inside the gland nuts. Now, I'd promised myself I'd limit this section to two pages, so I'll stop it here and request that if any of our chapter members have weirdo or different mixer valves or carburetors on their rowboat motors, it would be interesting if they could write something up about them to share with their fellow enthusiasts.

From left to right -Evinrude Rowboat Motor mixer valve with flange mount; Wisconsin rowboat motor mixer valve with a pipe-thread mount; four-ball Kingston float-feed carburetor.

Figure 1 - Clockwise from top left - Mixer valve body; poppet valve chamber cap and travel adjustment knob; poppet valve; fuel needle valve assembly; and poppet valve spring. This mixer uses an internal valve spring.

Suggested Torque Values for Threaded Fasteners

Suggested Torque Values (+/- 5%) to Produce Corresponding Bolt Loads

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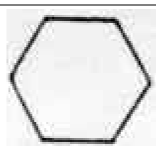
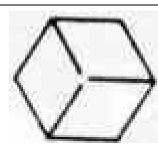
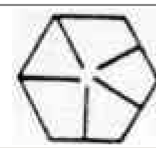
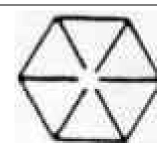
This table contains assembly torques (dry and lubricated) for threaded fasteners ranging in thread size from #10-24 to 1”-12 TPI nominal Unified thread size. Data is provided for grade 2, grade 5, grade 7 and grade 8 steel fasteners. In most cases involving rowboat motors, you’ll probably work with grade 2 fasteners.

U.S. BOLT GRADES

			
SAE 2	SAE 5	SAE 7	SAE 8

	2	5	7	8	SOCKET HEAD CAP SCREW
I.D. Marks	No markings	3 lines	5 lines	6 lines	Allen head
Material	Low carbon	Medium-carbon, tempered	Medium-carbon, quenched & tempered	Medium-carbon, quenched & tempered	High-carbon, quenched & tempered
Tensile strength (Minimum)	74,000 psi	120,000 psi	133,000 psi	150,000 psi	160,000 psi

Torque values for all fasteners are for modern off-the-shelf purchased items. Personally, I usually assume that I’m dealing with grade 2 fasteners for most antique motor applications.

NOTES: 1) Clamp load = 75% * Proof * stress area. 2) Torque is R * D * T where R = .200 (dry) or .150 (lubricated), D = Nominal diameter (inch) and T = Desired clamp load (lbs). Lubricated includes lubricants, lubrizing plating and hardened washers.

Nominal size or basic major diameter of thread		Stress Area in^2	Grade	Proof Load ksi	Clamp Load (1) lbs	Assembly Torque Dry in*lb	Lubricated in*lb	Dry ft*lb	Lubricated ft*lb
#10-24	0.1900	.0175	2	55	723	27	20		
#10-24	0.1900	.0175	5	85	1117	42	31		
#10-32	0.1900	.0200	2	55	824	31	23		
#10-32	0.1900	.0200	5	85	1274	48	36		

U.S. BOLT TORQUE SPECIFICATIONS

Torque in pounds-foot

		2	2	5	5	7	7	8	8	Socket head cap screw	Socket head cap screw
Bolt Dia.	Thread per inch	**Dry**	**Oiled**	**Dry**	**Oiled**	**Dry**	**Oiled**	**Dry**	**Oiled**	**Dry**	**Oiled**
1/4	20	4	3	8	6	10	8	12	9	14	11
1/4	28	6	4	10	7	12	9	14	10	16	13
5/16	18	9	7	17	13	21	16	25	18	29	23
5/16	24	12	9	19	14	24	18	29	20	33	26
3/8	16	16	12	30	23	40	30	45	35	49	39
3/8	24	22	16	35	25	45	35	50	40	54	44
7/16	14	24	17	50	35	60	45	70	55	76	61
7/16	20	34	26	55	40	70	50	80	60	85	68
1/2	13	38	31	75	55	95	70	110	80	113	90
1/2	20	52	42	90	65	100	80	120	90	126	100
9/16	12	52	42	110	80	135	100	150	110	163	130
9/16	18	71	57	120	90	150	110	170	130	181	144
5/8	11	98	78	150	110	140	190	220	170	230	184
5/8	18	115	93	180	130	210	160	240	180	255	204
3/4	10	157	121	260	200	320	240	380	280	400	320
3/4	16	180	133	300	220	360	280	420	320	440	350
7/8	9	210	160	430	320	520	400	600	460	640	510
7/8	14	230	177	470	360	580	440	660	500	700	560
1	8	320	240	640	480	800	600	900	680	980	780
1	12	350	265	710	530	860	666	990	740	1060	845

BOLT TORQUE FACTORS

LUBRICANT OR PLATING	TORQUE CHANGES
Oil	Reduce torque 15% to 25%
Dry Film (Teflon or moly based)	Reduce torque 50%
Dry Wax (Cetyl alcohol)	Reduce torque 50%
Chrome plating	No change
Cadmium plating	Reduce torque 25%
Zinc plating	Reduce torque 15%

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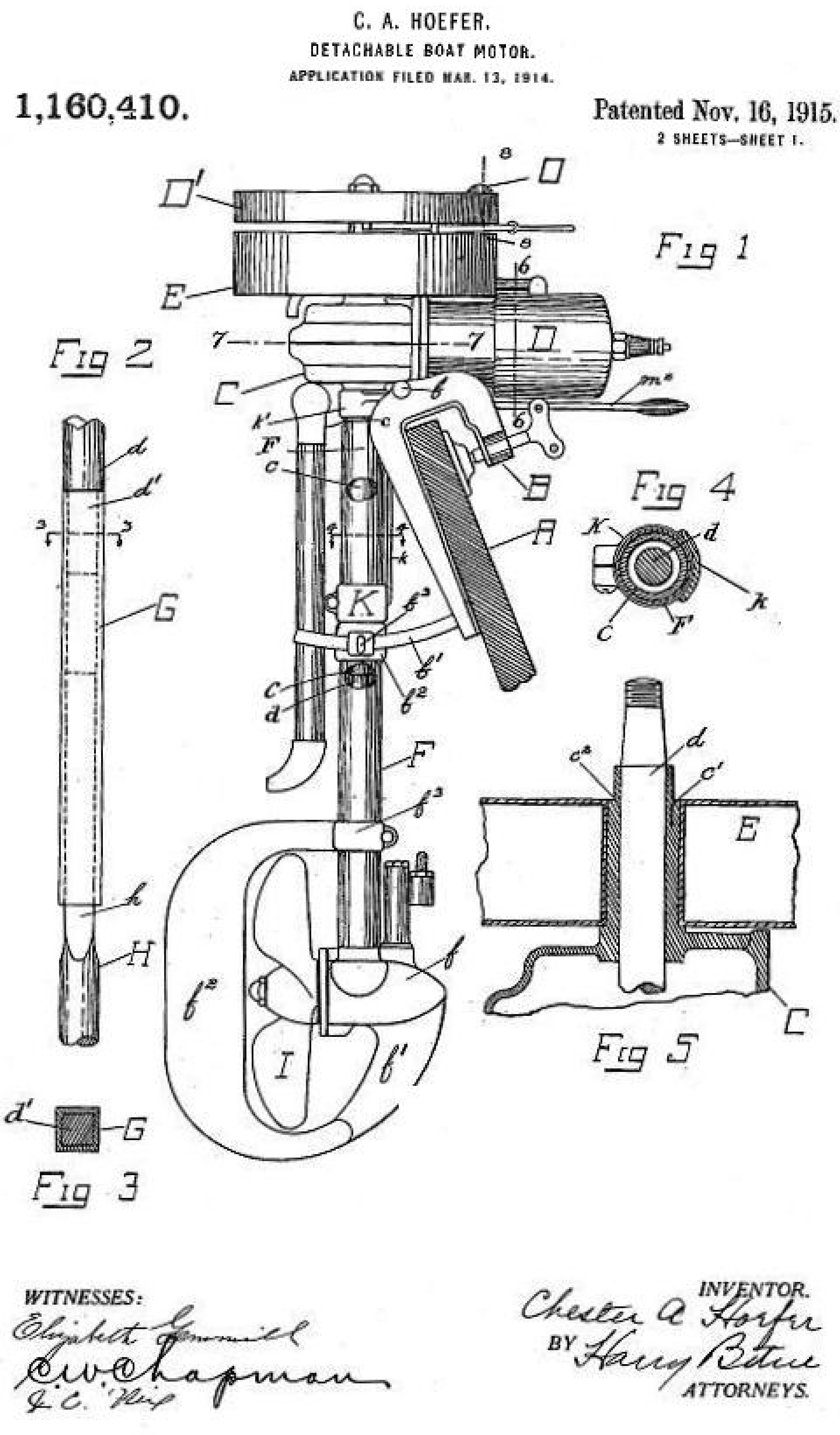
FEATURING ROWBOAT MOTORS OF INTEREST



Here's an easy one, guess which motor this patent covers (hint - it was sold under more than one name)