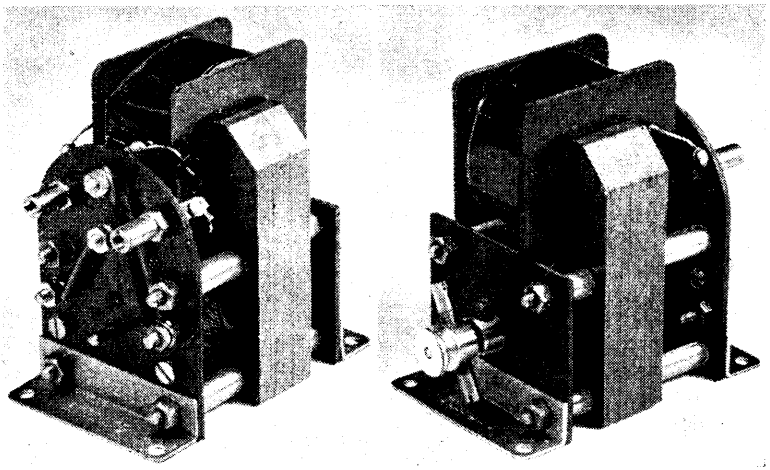
MODEL MAKER
MOTOR TESTS

Taycol TORPEDO



By R. H. WARRING
and E. J. HOOK

LATEST in the range of Taycol motors, the "Torpedo" has recently came on to the market at 29/6. Utilising a number of standardised "Taycol" parts, it is nevertheless quite a different job from the cheaper engines and is obviously intended as a high-power unit for model boats. Weight is 12½ oz., and the motor, although open in construction, is reasonably compact.

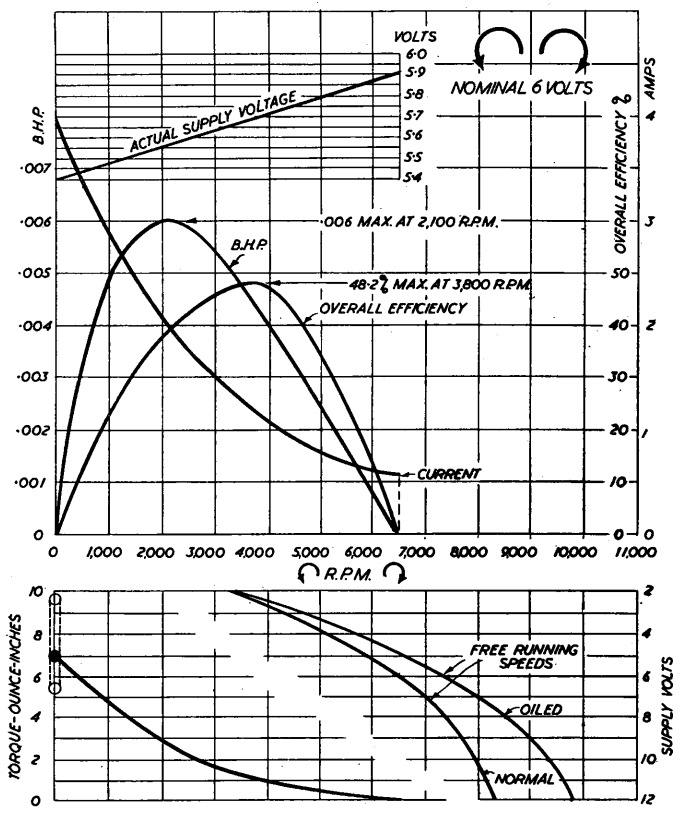
The "Torpedo" is a low resistance series wound motor, which means that the current consumption is high but the resulting power performance is quite outstanding. A maximum brake horse power of .006 is achieved at a speed of 2,000 r.p.m. on a 6-volt supply for a current drain of roughly 2 amps and maximum overall efficiency, at about 4,000 r.p.m., approaches fifty per cent. The torque curve is most consistent, with a very high initial torque and a torque output in excess of 1 ounce-inch maintained up to 4,000 r.p.m. or nearly two-thirds of the free running speed. Also the motor will run efficiently on any supply voltage between 2 and 12 (with proportionately modified performance, of course).

Running was found to be particularly smooth at all loads. Direction of rotation, as supplied, is anti-clockwise, viewed from the driving pulley end. This is also a "preferred" direction mechanically as the brushes trail with this direction of rotation. Reverse direction rotation can be obtained by switching the external straps—to connect terminal 2 to 5 (instead of 6) and 3 to 6 (instead of 5). On measured runs taken in either direction in close sequence there was a very slight increase in free-running speed with anti-clockwise rotation at all applied voltages, viz.—

Supply volts	2	4	6	8	10	12
r.p.m. (clockwise)	3,200	5,120	6,160	6,800	7,450	7,700
r.p.m. (anti-clockwise)	3,300	5,250	6,500	7,200	7,600	7,850

This particular test also emphasised a most unusual feature of the "Torpedo" (and, indeed, all Taycol motors). It was noticeable that free running, particularly on the higher applied voltages, there was some variation in r.p.m., and noise suggestive of excess friction. Oiling the bearings produced no marked effect, but oiling the commutator and brushes, as suggested by the designer, immediately stabilised the running with a marked improvement in r.p.m. We have previously condemned the use of oil on brush gear in view of the troubles it invariably gives on most motors, but the Taycot is undoubtedly an exception to this rule. It can only be presumed that the dimpled brushes are effective in accepting oil as a lubricant and wiping the film so thin that it offers no effective electrical resistance. The Taycol motor will take oil in excess with commutation appearing to benefit—the only real objection to this practice being that the whole of the motor gets so dirty through the excess oil thrown about.

The rule in this particular case would appear to be that oiling the commutator seems to be an immediate cure for any hesitancy in the performance. Such effects are only likely to be pronounced at the higher speeds, and free running. Performance on torque test at increasing loads was consistent with the initial lubrication. The effect of excess oiling on the free running speed at various applied voltages is well illustrated by the graph.



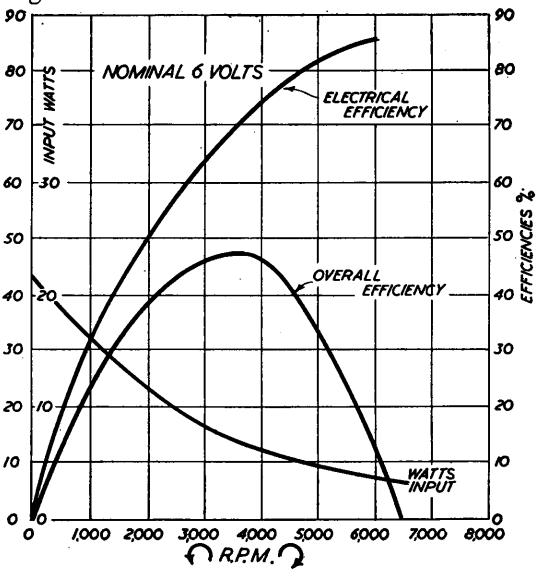
Constructionally, the field consists of twenty-five .025 in. laminations mounted on steel studding and located between 1/16 in. Paxolin end plates by brass sleeves. The field coils are wound on a square Paxolin bobbin, protected with an outer wrapping of cellulose tape. The field winding is split (see wiring diagram), with total resistance of 0.2 and 0.3 ohms, respectively. This difference in resistance is accounted for by the fact that a similar number of turns is probably used on each coil, but the outer coil, having a larger diameter, incorporates a greater length of wire. The winding is of 22 s.w.g copper wire with Lumex insulation.

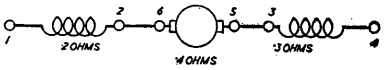
The three-pole armature consists of twenty-three laminations of slightly thicker material (.028 in.), the laminations being pressed on to the .095 in. diameter steel spindle, then fitted with brass sleeves at each end to act as distance pieces. Armature windings are in 24 s.w.g. wire (again with Lumex insulation) and having a resistance of 0.4 ohms.

The commutator is of the disc type, ¼ in. diameter, with three phosphor-bronze segments tagged to a backing disc of insulating material. It seems small in view of the order of current which it is called upon to pass, but showed no appreciable signs of burning or deterioration when examined after the test runs. It was very dirty, which was only to be expected after the oiling treatment, but arcing is quite small even at high currents. Brushes are phosphor bronze strips with dimpled contact surfaces.

The armature unit is impregnated with a cellulose-base lacquer to lock the windings in place. The spindle runs in the Paxolin end plates which form the bearings, and the balance is undoubtedly good since there is very little vibration when running and wear on the plain bearings appears negligible.

The long end (drive end) of the spindle is fitted with a brass collar followed by a pulley with "spoke" driving arms, both being locked on to the shaft with grub screws. Positioning of the collar governs the end play of the shaft although this will normally tend to run with the armature distance piece bearing against the end plate due to brush pressure. Brush pressure can quite easily be adjusted, but this does not appear to be necessary. The spindle, incidentally, will just take a tapped 6 B.A. thread so that the smallest size of "Ripmax" flexible coupling unit can be screwed on — one of these





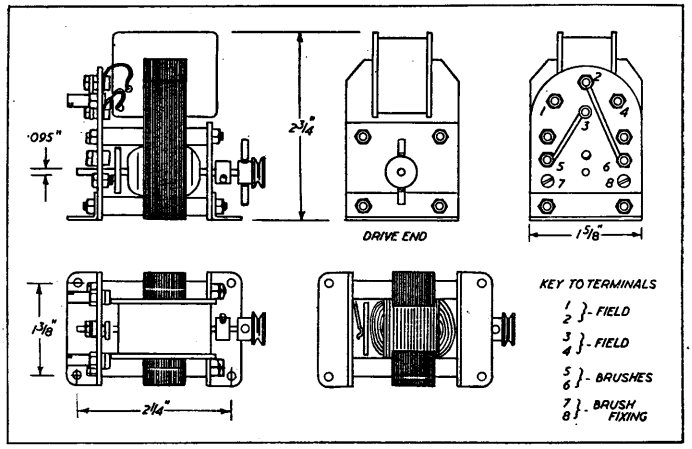
units actually being used to connect to the eddy-current dynamometer.

A particularly pleasing feature of the "Torpedo" is that it remains quite cool, even when dwelling in a near-stalled condition with 3 amps or more passing through the windings. Thus there is very little difference between "hot and "cold" performance in this region. Calculated total resistance on the basis of stall current and applied voltage was 1.35 ohms. Total resistance as measured, static, was 1.3 ohms, but static measurements of this nature are not necessarily representative of running conditions. It would appear, however, that the contact resistance at the brush gear is of the order of half an ohm.

For maximum power performance the ideal operating speed is in the region of 2,000 r.p.m. Here the overall efficiency is approaching 40 per cent. and some 3 ounce-inches of torque is available. At maximum efficiency .004 brake horsepower is available, for a current consumption of 2 amps. Torque is then 1 inch-ounce. To get the best out of the "Torpedo" it would therefore appear advisable to operate within the range of 2,000 to 4,000 r.p.m. There is very little point in operating at a higher speed since the power available drops off rapidly; or at a lower speed because of the rise in current drain with a decreasing power output and efficiency.

The only drawback from the point of view of the boat operator is the high current demand, necessitating the use of very generous battery sizes. An accumulator would definitely be preferred to a dry battery, although an "Ever-Ready" lantern-type battery would probably give satisfactory results. It will be noticed from the graph that the voltage of the test battery was affected by the current drain, the battery being somewhat "down" to start with, and the watts input curve has been calculated on the basis of corrected voltage applicable to individual speeds.

It can be remarked that all test data were particularly free from "scatter" when plotted on the graph, which can be taken as a tribute to the consistent operation of the "Torpedo". It does, in fact, appear to be an excellent motor throughout, of exceptionally high efficiency for a model motor, and one with plenty of available power over a wide speed range. Also its price is very reasonable.



As to recommended marine propeller sizes, the designer states that a 1½ in. standard E-D screw has given excellent results on the 26-in. Veron Police Launch and 24-in. "Dolphin". Further information on propeller sizes and power requirements will be forthcoming when we have completed our own initial series of tests on this subject.

MODEL BOAT CLUBS

One of the noticeable features of 1955 has been the continued—in fact, the accelerated—growth of interest and activity in the sphere of model boating, particularly in respect of power models. New enthusiasts to the hobby are recruited practically daily, and we have heard of several new clubs which have been formed.

MODEL MAKER is at the moment conducting a survey into model boat activities, the results of which will directly benefit the movement. Clubs affiliated to the M.Y.A. and M.P.B.A. are known to to us, and we have been able to send round copies of a simple and very brief questionnaire; non-affiliated clubs are not at present listed anywhere, but we are hoping to compile a complete register of all clubs throughout the country, and to do this we need the assistance of every club. If *you* are a club secretary and have not received a copy of our questionnaire, please send in for one immediately. The first and obvious benefit from the register is that we shall be providing copies of it to interested enquirers at the National Boat Show, so that you may well increase your membership sometime in January. The Boat Show, however, opens on December 29th, and the register must be printed by then. Please send in straight away, to ensure that your club is included, to:

Boat Club List,
MODEL MAKER,
38 Clarendon Road,
Watford, Herts.