Get the best out of your Dynastart

PHOTOGRAPHS AND TEXT BY **JOHN WATNEY**

THE DYNASTART is a dynamo for charging, and a starter motor in a single unit which can be easily fitted to an existing small marine engine. It is also the registered trademark name for the unit manufactured by Siba Electric Limited, of Camberley, Surrey.

It has the advantage of not requiring a gear on the flywheel, and there is no starter pinion mechanism to go wrong or rust up. But its application is limited to small engines of up to about 400 cc single cylinder, and 500 cc twin cylinder. Providing the engine is of suitable size and running speed, all that is needed is the provision of a robust bracket connection to hold the Dynastart, and a pulley on the engine for the belt drive—often the flywheel can perform that function.

Starting is effected by either a key switch or starter push-button, when the Dynastart works as a motor. When the engine starts and the switch or push-button is released, the Dynastart is then in turn driven by the engine and works as a generator. The generation increases with the engine speed, and as soon as the rated voltage is reached the cut-out switch automatically closes. Dynastarts are supplied for rotation in either direction.

The use of a Dynastart is restricted by a combination of high starting torque and high working speed. Therefore an engine which is heavy to turn over and is high revving—that is, usually over 3 500 rev per minute—will probably not be suitable for a Dynastart. In which case the conventional, but less convenient and more expensive, separater starter motor and dynamo installation will have to be used.

The installation of a Dynastart must not be considered without first getting technical advice, or carefully working out the required ratio of the pulleys for the drive. The ratio should be kept as low as possible while still giving adequate starting torque. If a low-speed charging is necessary a higher ratio may be needed, but the result must not drive the Dynastart in excess of 10 000 rev per minute or the armature will be damaged.

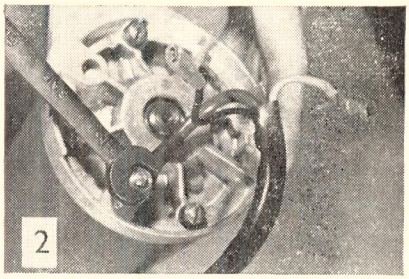
The manufacturers give the following guide to pulley ratios and engine speeds:

> Although a high ratio is desirable from the standpoints of greater cranking torque, and lower engine speed for full charge current, it is of course preferable to avoid high-speed running of the Dynastart when practicable. For example, if it produces 5 amperes at 3 500 armature rev per minute, a 2:1 ratio would give an engine speed of 1 750 rev per minute for this output. With a 3:1 ratio the same generator would produce 5 amperes at an engine speed of only 1 166 rev per minute. If, however, the maximum engine speed is 3 600 rev per minute, these two ratios will result in corresponding maximum Dynastart speeds of 7 200 and 10 800 rev per minute respectively, the latter being considered somewhat excessive for continuous running.
>
> Although an engine has a rated maximum speed, it is often possible to exceed that speed. It is necessary, therefore, to take into account the overspeed conditions as well as the rated maximum speed when establishing the ratio. Consider an engine governed to run at 3 600 rev per minute. With a 3:1 ratio the armature speed will be 10 800 rev per minute, which is undesirable. But if this engine were run without the governor, it might reach a speed of 4 500 rev per minute, with a resulting armature speed of 13 500 rev per minute, which cannot be tolerated. It would then be necessary to use a lower ratio to keep the overspeed down below 12 000 rev per minute. A ratio of 2·6:1 would give an overspeed of 11 700 rev per minute and a normal maximum of 9 350 rev per minute, both of which may be considered to be satisfactory provided, of course, that the overspeed is restricted to brief periods.

The Dynastart type DS418 which is illustrated here has a 12 volt, 5 amp continuously rated output, is totally enclosed, and is supplied complete with switch assembly box containing cut-out and regulator, and starter solenoid (1). Rotation is clockwise, anti-clockwise and reversible. All bearings are pre-packed and no greasing is needed.

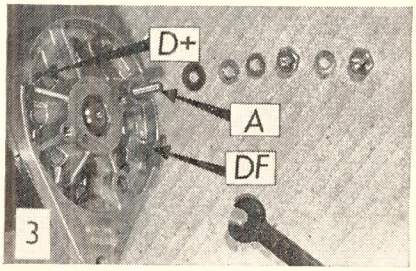
The maintenance of a Dynastart—which is basically dismantling for cleaning and inspection—is shown in the following sequence of pictures.

Before attempting to do any work on the Dynastart installation, the battery must be disconnected. Remove the two pull-off connectors at the back of the Dynastart marked DF and D+; note the terminal markings. Remove the starter cable 'A' (2). Loosen the mounting

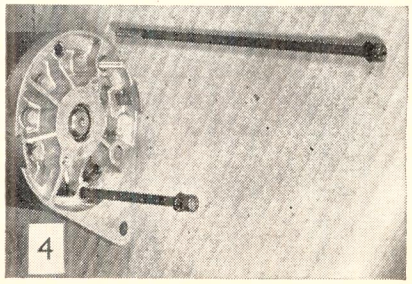


bolts and remove Vee-belt(s), withdraw mounting bolts, remove the Dynastart and place on a clean bench.

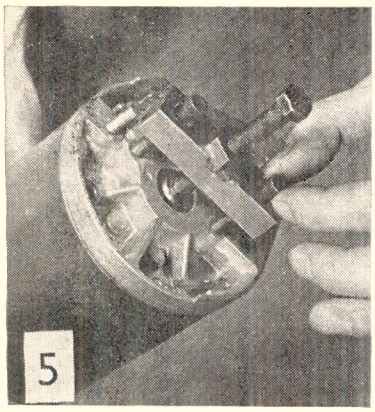
Remove starter lead from terminal 'A' nuts and washers (3). Note sequence of washers. Remove the through bolts.



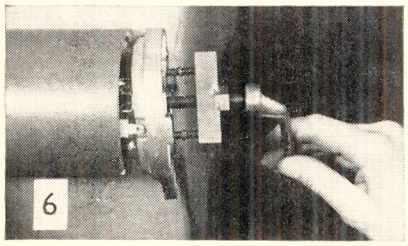
Picture shows through bolts and terminal washers removed (4). A tool for removing the end bracket can be manufactured

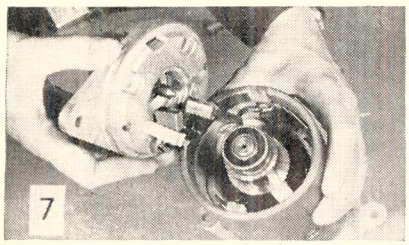


from a metal bar, two $\frac{1}{4}$-inch UNC screws and a $\frac{3}{8}$-inch central bolt. Attach extractor tool (5). Screw in holding

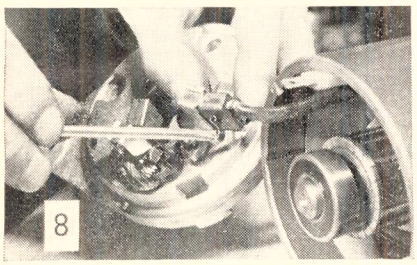


screws. Tighten up extractor tool and withdraw end bracket (6). Picture shows end bracket withdrawn (7).

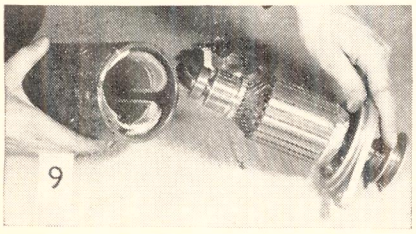




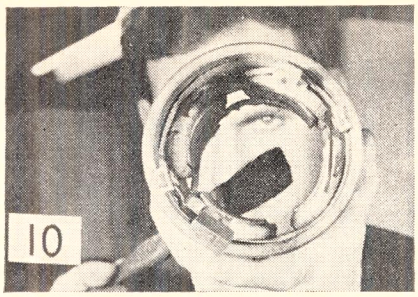
Remove brush from brush box (8). Slide armature out of yoke. Picture shows



armature removed from yoke (9). Clean carbon dust from the Dynastart; use a

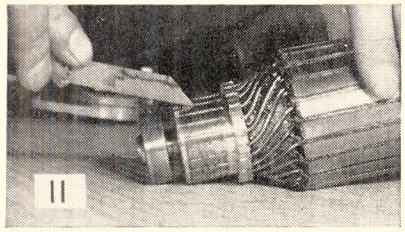


clean paint brush and remove all dust from inside the yoke and end bracket (10). Clean commutator micas; use a hacksaw blade with teeth ground down



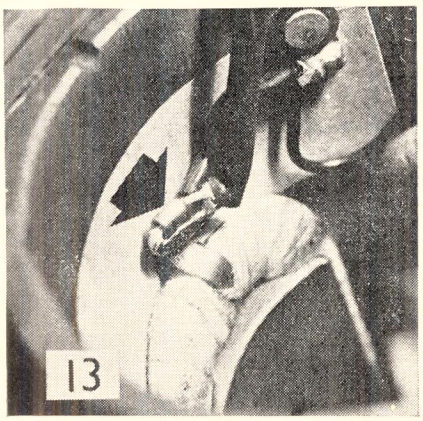
at the sides and ensure that the mica inserts are about $\frac{1}{32}$ inch below the copper (11). Take care not to scratch the commutator surface.

Clean the commutator surface; use a petrol-soaked rag and remove any oil or carbon deposits. Lightly polish the commutator; if the surface of the com-



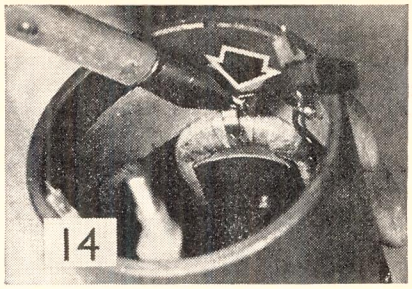
mutator is marked, it may be lightly polished with wet and dry paper, but if badly scored it must be professionally machined and undercut (12).

The brush connection to stator coils (13) has to be un-soldered before old brush is removed. Fit new brush to stator

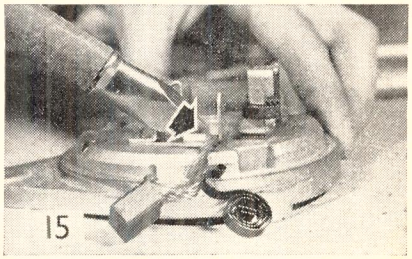


coils (14). If the brushes need replacing, this can be done by removing the old brush and soldering the new brush into position. Care must be taken to ensure that the short wire link between the brush connection and the D+ terminal is secure and that no loose solder remains in the Dynastart. (New brushes can be obtained by post from Siba.)

Fit new brush to end bracket (15).

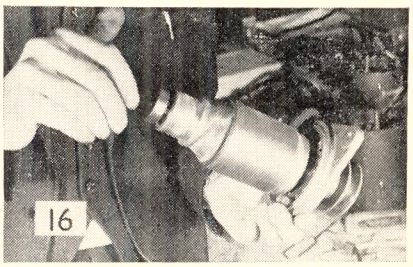


This brush can either be soldered into position as shown, or the complete brush and brush plate can be refitted to the bracket with the parts provided in



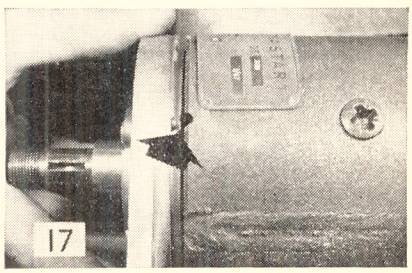
the fitting kit, but this will depend upon the tools available. If there is any doubt as to your ability to fit new brushes, the services of an auto or marine electrician should be obtained.

Check drive end bearing (16). Hold the drive end bracket in one hand at an angle of 45 degrees and rapidly spin the armature. Any apparent roughness indicates a worn bearing and new bearings and rivets can be obtained by post from the manufacturer; alternatively they will fit a new bearing if the old bracket is returned. The commutator end bearing should also be checked by hand and, if in doubt, this must also be replaced. Ideally, an insulation test should be made to ensure that there is no connection between any of the coils and the yoke, or between the insulated brush box and the end bracket. The field resis-



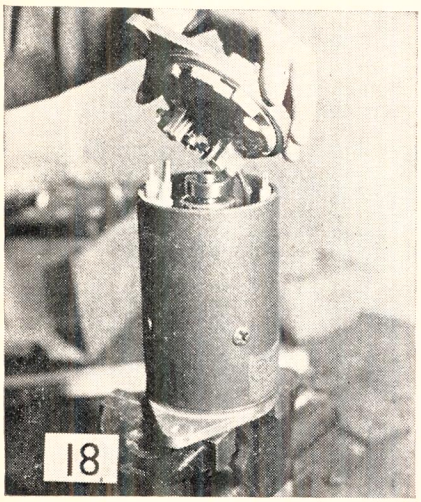
tance measured between terminals DF and D+ should be approximately 4·5 ohms. If all is correct, the Dynastart may be reassembled.

Insert the armature into the yoke (17).



Ensure that all internal connections are clear, and that the locating dowel on the end bracket fits into the recess in the yoke. The commutator end bracket should be heated in an oven or on a radiator until it is almost too hot to hold to enable the bearing to be fitted without undue force.

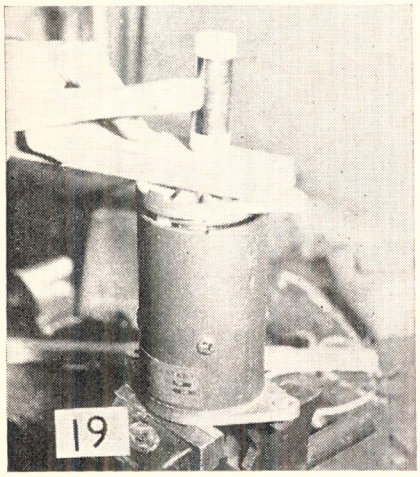
Replace end bracket (18). Insert the brush into the holder, ensure that the 'A' terminal insulator is in position,



and slide the end bracket over the bearing. The brushes may be held clear of the commutator by tilting them away from the springs and lowering the end of the spring on to the side of the brush.

Push the brushes down and ensure that the springs hold the brushes securely against the commutator, that the armature is free to revolve without fouling any of the internal connections and that the brush pigtails are in no danger of being trapped between the yoke and the end bracket.

Gently tap the end bracket into position (19). It is most important that the minimum amount of force should be



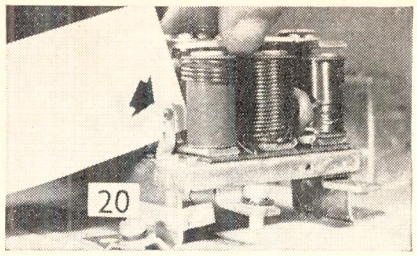
used to fit the end bracket, otherwise damage to the bearings will result. When the end bracket is in position the through bolts may be inserted, tightened with a large screwdriver and the terminal nuts fitted. Before refitting the Dynastart to the engine, a quick check may be carried out by connecting two starter

Petters' Corner

It's back to engines again next month. In the March issue John Watney turns his camera on the Petter 16·4 bhp marine diesel for another of his down-to-earth engine care guides. And for those who do not happen to be Petter-owners the same issue will carry a special article on preparing any engine for the new season, contributed by that wide-cruising man-and-wife team, Hilary and J K Wickham.

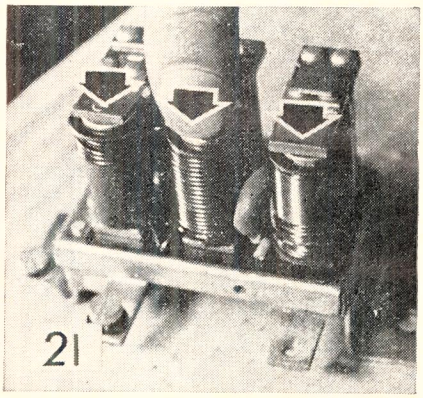
wires from the battery to the Dynastart, the negative wire to the Dynastart yoke or securing lug, and the positive wire to the 'A' terminal. The Dynastart should then motor at high speed. If the DF terminal is shorted to earth by means of a length of wire or a screwdriver blade, the Dynastart speed should quickly drop to around 2 000 rev per minute. If this test is correct, the Dynastart may then be fitted to the engine.

The voltage regulator CANNOT BE SERVICED without the necessary equipment and, if there is any doubt as to the operation of this item, it should be returned to the factory for examination. If, for any reason, it is necessary to remove the cover (never do so during the guarantee period as this invalidates the warranty), first **disconnect the battery.** The only operation that can be carried out on this unit is the cleaning of the contacts (20), which should be done with very fine emery paper by

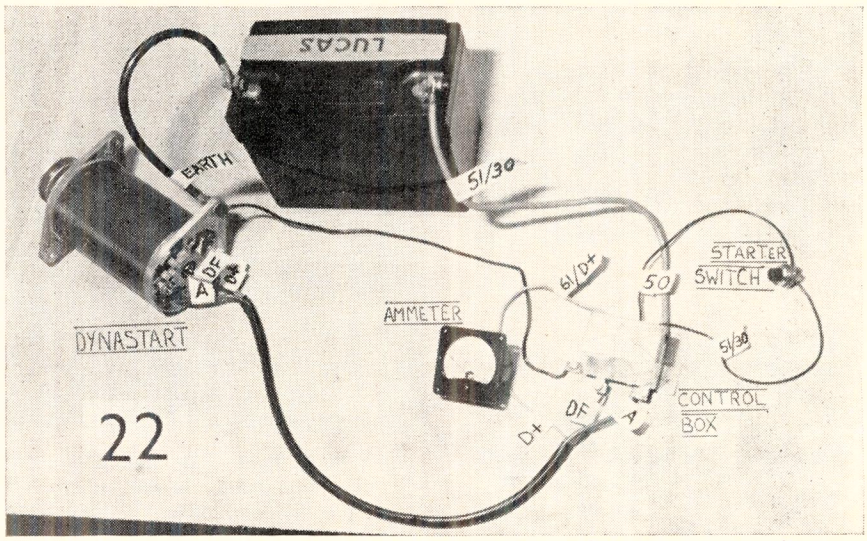


passing it through the closed contacts, and finally cleaning with a piece of clean thin card used in the same manner.

NOTE: NEVER close the cut-out contacts by hand with the Dynastart running, or with the battery connected (21) as a dangerous short circuit will



result. **Owner servicing of this equipment is not encouraged by the manufacturers.** The Dynastart circuit (22). When reconnecting the Dynastart installation, care must be taken that the connections to the terminals DF and D+ at the rear of the Dynastart are not interchanged. (These unfortunately are identical in shape and size and very easily transposed. Running with the connections the wrong way round will cause internal damage to the field circuitry.—ED). All connections should be kept clean and tight.



It looks a muddle but anyone installing or maintaining a Dynastart will be glad to see our photograph. The 'Earth' return runs from either the engine or the Dynastart. The starter type lead 51/30 runs from battery '+' terminal to 51/30 terminal on control box. The small pushbutton starter switch is connected up between terminals '50' and '51/30'. The ammeter is connected between terminal '61/D+' and 'D+' on the Dynastart. 'A' runs from the control box to Dynastart; as does 'DF'.