alternator, and a voltage-controlled current regulator with a non-pulsed output would be needed.
I. R. Sinclair,
Braintree,
Essex.

Mr Caunter replies:
While I agree with Mr Sinclair that most alternators work on the principles he describes, and there are several obvious advantages to be gained from using this method of construction, his suggestion is not applicable to the conversion of a dynamo for two important reasons.

Firstly, the dynamo has a solid steel yoke and cast-iron pole pieces and is therefore not designed for rotating field operation. If this were attempted, a large amount of power would be lost in circulating eddy currents within the solid stator. The armature, on the other hand is laminated to reduce this loss to a minimum when rotated within the stationary field supplied by the existing field winding. Secondly, since the stator is not of true annular form, the variation in reluctance of the magnetic circuit seen by the rotor as it rotated would produce serious distortion to the output waveform.

The best way to improve the performance of the alternator is to get as much copper as possible into the armature slots. This necessitates using a finer gauge wire to improve the filling factor, and either winding for 240V in a single winding taking great care over the insulation, or by winding several parallel windings together and operating at a lower output voltage as in the present design. It is quite possible that the output could be increased to over 300W in this way.

Incidentally, if anyone has been put off the idea of building this generator because of the machining needed to construct the slip rings, and has no scruples about passing a current through the dynamo bearings, the following suggestion passed to me by a colleague may be worth trying. Connect one end of the armature winding to the shaft and the other to all the commutator segments shorted together. With the earth brush removed, the output can now be taken from the alternator casing and the live (insulated) brush output.

A NOVEL CLASS B OUTPUT?

As far as I know all class B output configurations are based on the same principle: two emitter followers are tied together and the circuit is improved, in a more or less elaborate way, by replacing a single emitter follower by a two- or three-transistor circuit in an attempt to approach an "ideal" emitter follower.

An example of this is the Quad 303 which has two triplets in the output stage. Although a very fine amplifier, it exhibits clearly the shortcomings of this type of output circuit, which are: (a) the quiescent current has to be adjusted; (b)

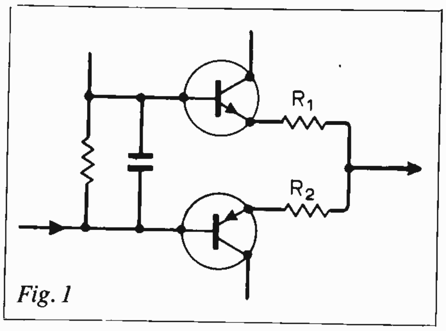

Fig. 1

the quiescent current is dependent on the temperature; and (c) too much quiescent current results in a kind of "take over distortion". This kind of distortion is due to a signal current flowing through the resistors R_1 or R_2 (Fig. 1), cutting off the quiescent current of the other stage, which results in a voltage shift at the input necessary to keep the output following the signal.

It is obvious that crossover distortion decreases with increasing bias current. From the facts mentioned before it is also obvious that an increasing bias current causes an increasing "take over distortion". So, with this type of output there is an optional value for the quiescent current.

It is possible to overcome all these shortcomings by using the circuit shown in Fig. 2. This circuit has none of the limitations mentioned in (a), (b) and (c). The quiescent current is set at 15mA by Tr_7. (Later on 5mA proved to be sufficient.) For d.c. this transistor forms a constant current source as long as diode *D* is not forward biased. For small signals Tr_1 and Tr_4 can be regarded as a long-tailed pair without a tail, for positive signal the upper half (Tr_1, Tr_2, Tr_3 and Tr_4) is active behaving as a super emitter follower. The same for negative signals, but this time with Tr_1, Tr_4, Tr_5 and Tr_6.

Since Tr_1 and Tr_4 are used in both modes of operation and the output resistors are missing, no "take over distortion" is possible.

One advantage is a lower output impedance due to the missing output resistors.
Nico M. Visch,
Rotterdam,
Netherlands.

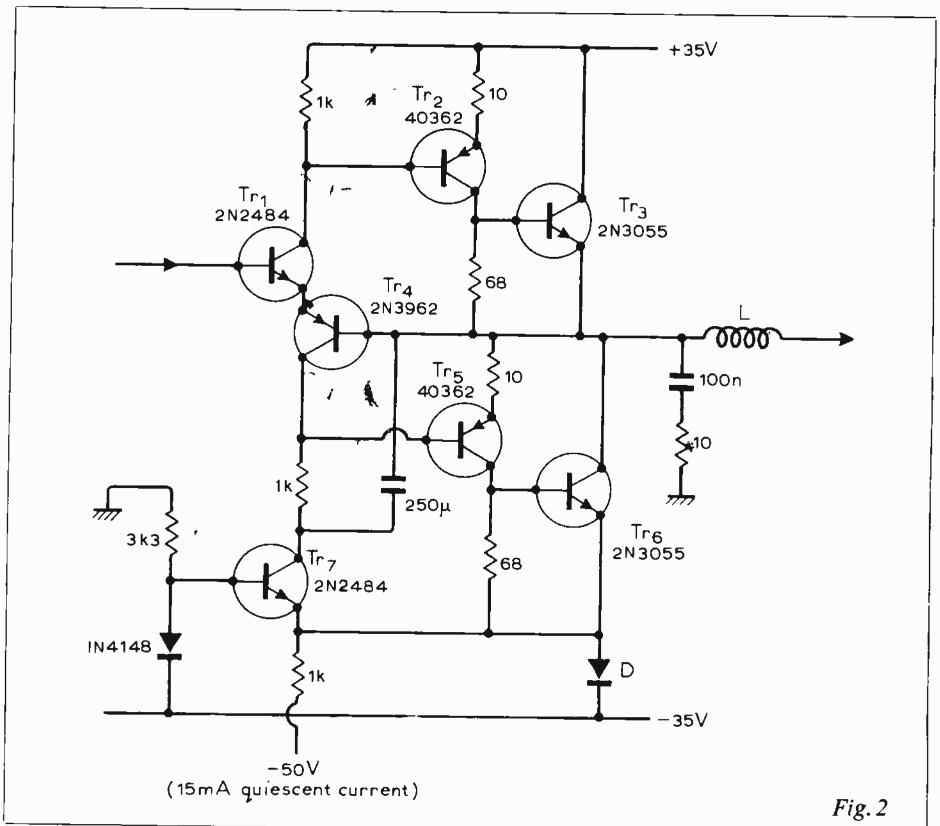

Fig. 2

DIGITAL SPEEDOMETER

I read the articles on the digital speedometer by Bishop and Woodruff in the September and October issues with great interest, but I feel that "average speed" is not really the parameter of interest. What one really wants to know is the difference between the elapsed time and the time which should have been taken to travel that distance at a particular speed.

The above comment arises from the fact that one usually knows the distance to be travelled and a reasonable average speed which one can hope to maintain during the whole journey. What is required is an indication of how much time you have in hand or how far you are behind the clock at any time during the journey. This is the information provided mechanically by the Halda Speed Pilot used by many trials drivers.

I would thus be interested in a modification to the design of the average speed part of the project to substitute an electronic equivalent of the Speed Pilot. This only requires multiplying the actual distance travelled by the inverse of an